

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY EDISON, NEW JERSEY 08837

3662

September 18, 1987

MEMORANDUM

SUBJECT: SAAD Waste Oil Geotechnical Investigation Fraft Report

FROM:

George R. Prince, Environmental Scientist

Environmental Impact Section Environmental Response Branch

T0:

Greg Powell, OSC EPA, Region IV

I have attached a copy of a draft report from our EERU contractor covering the drilling program we conducted at the SAAD waste oil site in Nashville, TN. This report will probably remain in draft from as our current contract has expired.

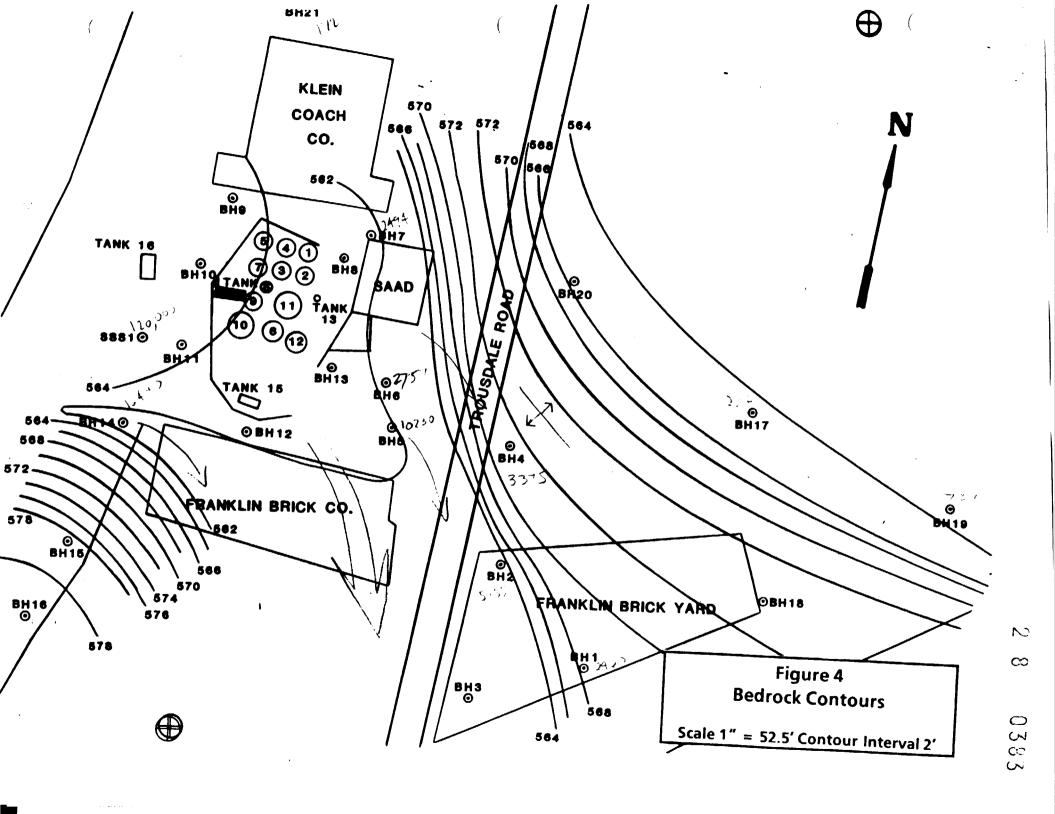
We garnered a significant amount of information from our investigations at the SAAD site. Most of this information is included in this report, but may further require some explanation. We should get together at your convenience to discuss our past efforts and evaluate future needs for removal actions at this site.

Call me if you have any questions at FTS 340-6649.

Attachment

call .~ 3/29/88

and week of April - May be



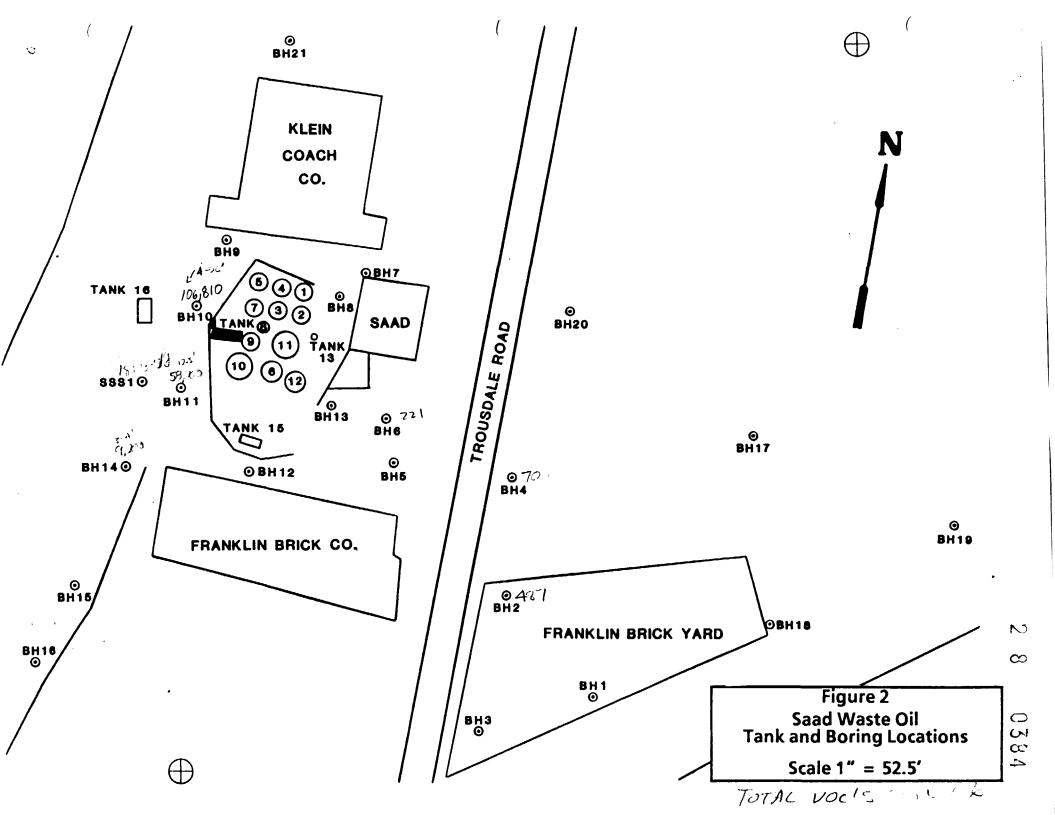
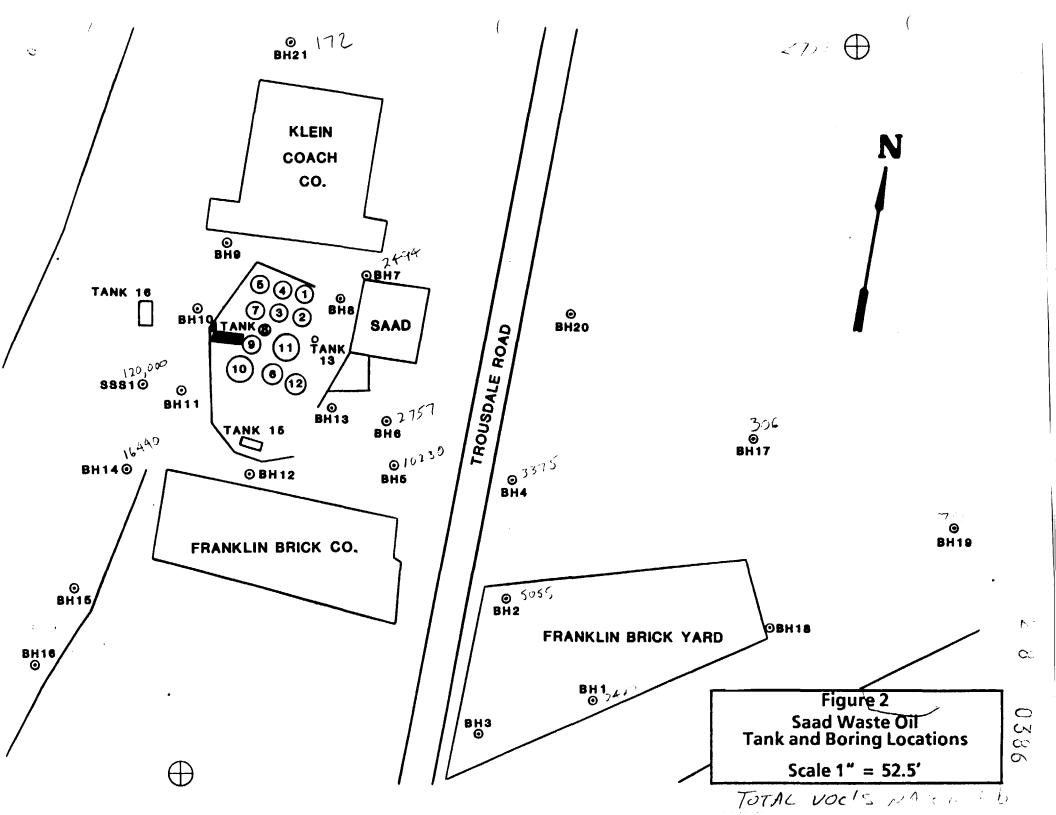
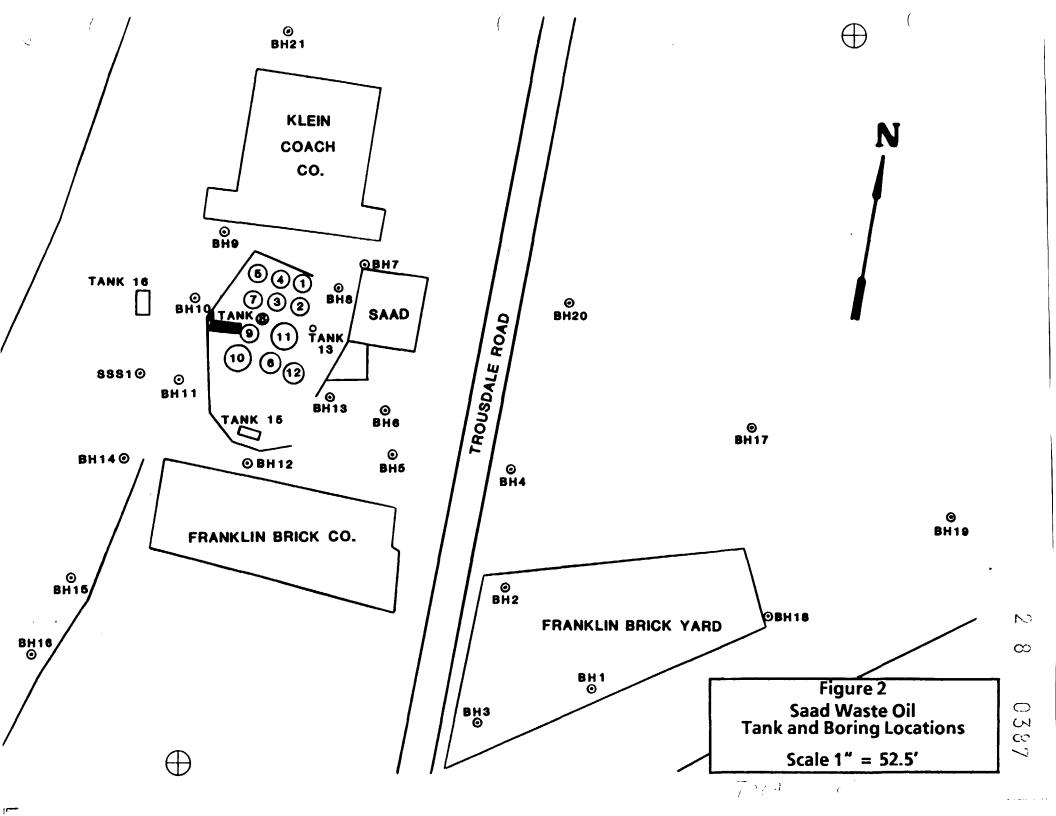


TABLE 7 **VOLATILE ORGANICS AND PESTICIDES/PCB'S IN WATER** Concentrations Reported In ug/L

	Borehole No./Date										
Parameter	B-1 3/23/87	B-2 3/23/87	B-4 3/23/87	B-5 3/23/87	B-6 3/23/87	B-7 3/26/87	B-14 3/26/87	B-17 3/23/87	B-19 3/23/87	B-21 3/25/87	
Lab Sample No.	5710	5709	5707	5705	5706	5715	5714	5708	5711	5713	
Methylene Chloride				200*		53*	2500			1*	
Trans-1,2-Dichloroethane	63		420	1200	1900	1800	4100	270	560	14	
Chloroethane	}				ł (13	
Toluene	88	4000	1100	7500	360	210	4100	ļ			
Total xylenes	1900	880	1500	1100*	150*		310			9	
Acetone		}					}			68	
Chloroform		}				1					
Ethyl benzene	220	120*	180				110*	{			
2 Butanone										9*	
4 Methyl-2-pentanone	}					1	210*	ļ			
Benzene	7*	55*						}			
1,1 Dichloroethane	78		55	120*	67*	81*	110*	14	39*	33	
1,1,1-Trichloroethane					}			}		8	
Trichloroethene				ļ]		5000	1			
Vinyl chloride	64		120	}	280	350		22	140	18	
Carbon disulfide				110*	1						
Pesticides/PCB's	ND	ND		ND	ND	ND	ND	ND	ND	ND	
4,4 - DDT			.56							1	

ND - None Detected *Denotes a value below the limit of quantification that is considered approximate





VOLATILE ORGANICS AN PESTICIDE PCB'S IN SOIL Concentrations Reported In ug/kg

	Borehole/Depth										
Parameter	B-2 6.0'-7.5'	B-4 4.0'-5.0'	B-6 10.0'-13.0'	B-10 4.5'-6.0'	B-11 12.5'	B-11 14.0′	B-11 16.0'	B-14 3.0'-4.1'	B-18 6.5'-8.5'	B-18 6.5'-8.5' Duplicate	SSS1 (Oil) (ug/g)
Lab Sample No.	8-2,5-5	B-4, 4'-5'	B-8,R-1,10-13	B-13,4.5-6	B-16,R-1,2.5	B-16,R-1,14	B-16,R-2,BOB	B-20,3-4.1	B-24, R-1, 6.5'-8.5'	B-24,R-1 6.5'-8.5'	7334
Methylene Chloride			16	950					38*		670
Trans-1,2-Dichloroethane	2*		8*	13,000							
2-Hexanone			23*	ĺ	<u> </u>				270		i
Toluene			54	29,000	53,000	100	3*	3,900			1300
Total xylenes	330	5 9 0	120	9,800		23		3,700			
Acetone	22			1,200*	1,100*	340	800	810*			
Chlorobenzene					ŧ 						
Ethyl benzene	95	110		2,200*	4,600	7*		610*	380		230
2 Butanone						71	96				
4 Methyl-2-pentanone	33			530*		38	49				
Benzene	5*										
1,1 Dichloroethane				18,000]]	19*	130
1,1,1-Trichloroethane				28,000	 						1700
Trichloroethene				930	<u> </u>						4800
Tetrochloroethene				3,200	}		}				4800
Vinyl chloride					ł	,					290
Trans-1,2-dichloroethylene	4										4200
Pesticides/PCB's (ug/g)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Aroclor 1242 (ug/l)					ĺ						36
Aroclor 1260 (ug/l)			1								17

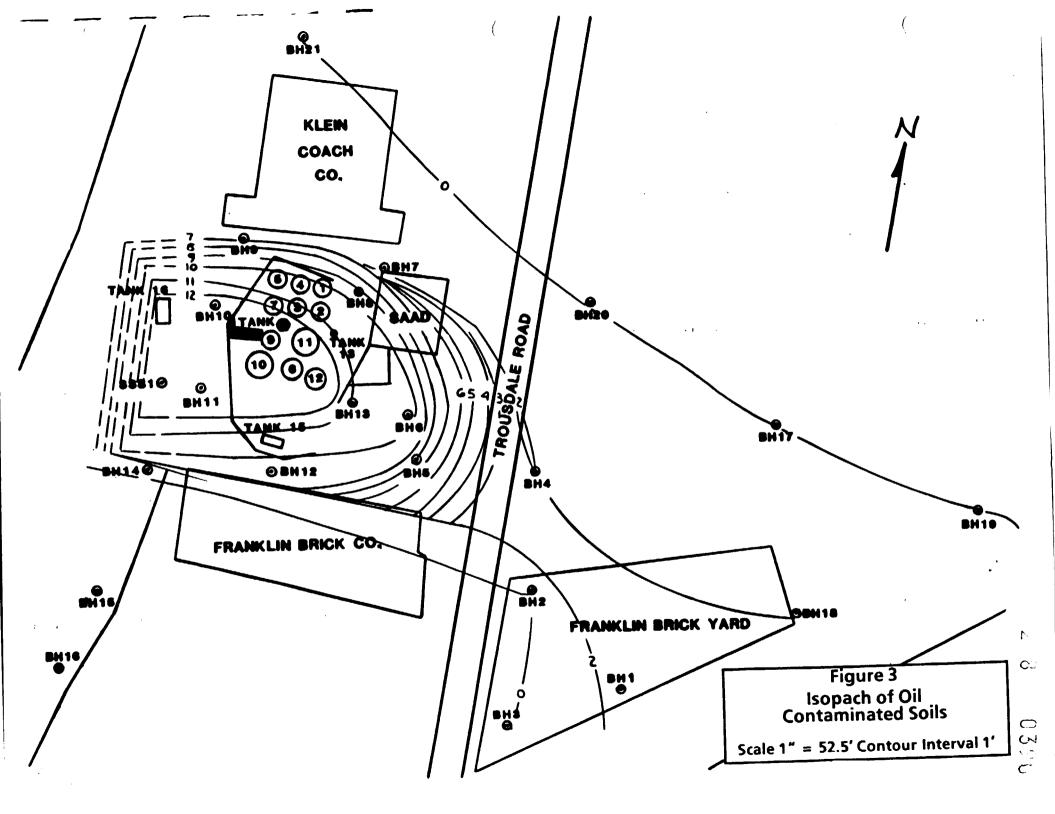
ND - None Detected *Denotes a value below the limit of quantification that is considered approximate

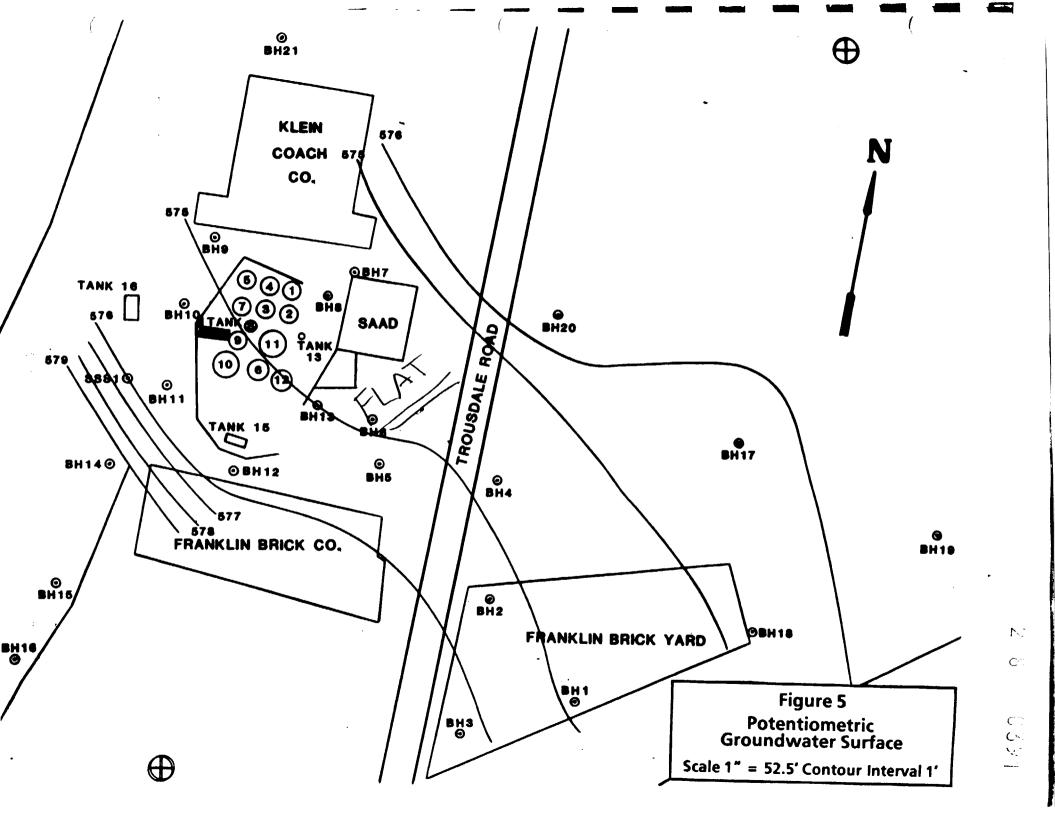
TABLE 8
OFF-SITE GROUNDWATER

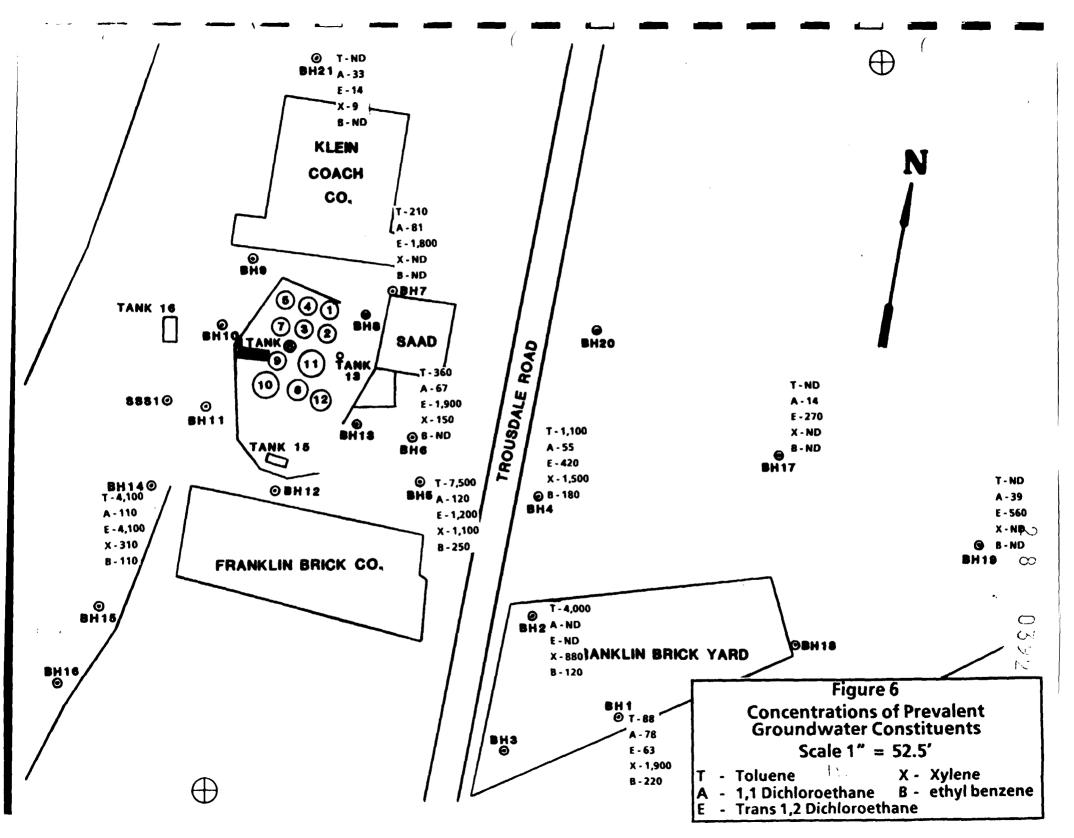
	Sample									
Parameter	Croft Spring	Croft Spring	Croft Spring	Saad Monitoring Well	Saad Monitoring Well 9/87	Well #1 9/87	Well #2	Well #2 9/87	Well #3	Well #3 9/87
Lab Sample No.	SS-S-7-W	SS-CF-SP	7333	SS-SS-MW7	3334	7331	SS-CF-MG2	7332	SS-CF-MW3	7353
Sampling Program			3/87		3/87	3/87		3/87		3/87
1,1 Dichloroethane	2)	ND	ND	1,100	1,700		ND	ND	ND	ND
Chloroform	0.5J			11	}	ļ				
Chlorobenzene	2 يا			}		}				}
Vinyl Chloride				6,600	9,800					
Methylene Chloride				19,000	5,500	ł ł				
1,1 Dichloroethene				690		}				
Chloroethane				240		ł L				
Trans-1,2-Dichloroethane	1			95,000	52,000					
1,2 Dichloroethane				31						}
1,1,1-Trichloroethane	}			15,000	6,300					}
Trichloroethene	1			69,000	30,000	<5				}
Benzene				67	} ?					
Tetrachloroethene	}			49,000	9,600					
Toluene				3,900	4,600					}
Chlorobenzene				87						
Ethyl benzene				310	500]	}

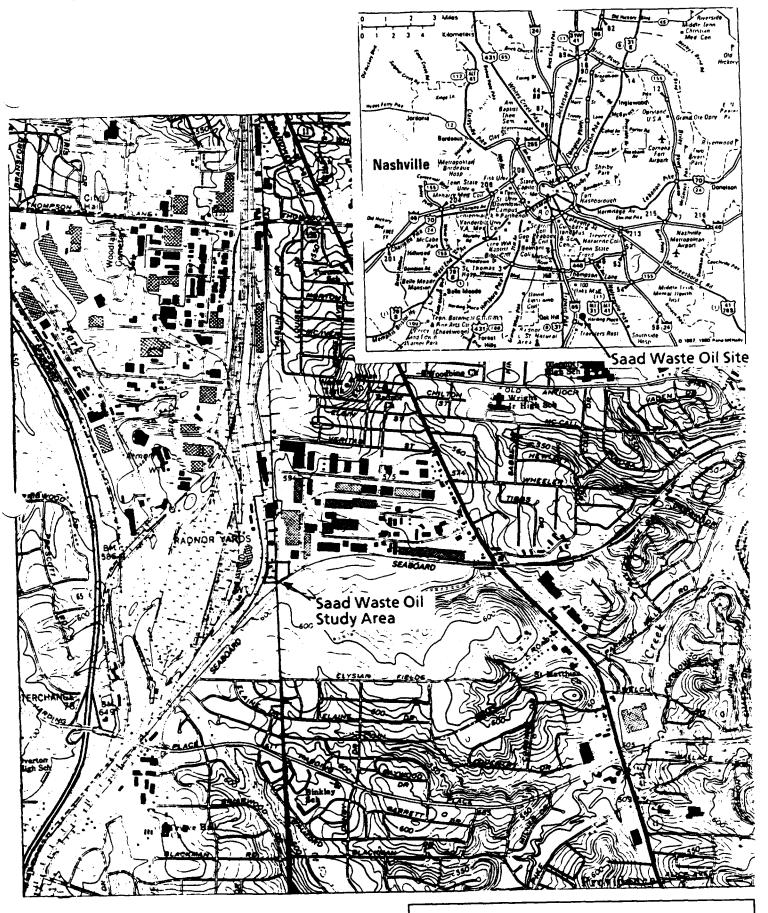
ND - No VOA's detected in analysis

J - Estimated Value









Scale 1:24,000 Source: U.S.G.S. Oak Hill and Antioch, Tenn. topographic Quadrangles 7.5 Minute Series Figure 1 Site Location Map Saad Waste Oil Site



SAAD WASTE OIL Geotechnical Investigation

8/20/87

SUMMARY

DRAFT

The US EPA Emergency Response Branch (ERB) and contract support group (Environmental Emergency Response Unit [EERU]) were tasked by Region IV EPA to perform a three part investigation of the Saad Waste Oil Site, Nashville TN. (Figure 1). The three sections of this investigation include:

- 1) Assess quality and quantities of fluids stored in above and underground storage tanks at the Saad Waste Oil site.
- 2) Determine volume and extent of oil contaminated soil.
- 3) Evaluate shallow groundwater contamination and potential migration from the site.

The tank investigation identified 16,876 gallons of fluid in three phases. Pumping and batching fluids is suggested, followed by a sludge removal program.

The soil boring and sampling program identified 9,378 yd³ of oil contaminated soil. The majority of this soil is on the Saad site, but there is migration to the southeast. Removal is unrealistic due to extent, volume and the water table in the oil contaminated soil. Remedial options include capping and a slurry wall/cutoff trench or in-situ stabilization. The latter is the most feasible due to the lack of perimeter space for a slurry wall or cutoff trench.

An examination of site groundwater demonstrated contaminant migration southeast and possibly a secondary northeast pathway. There was no correlation observed between the site and Croft Spring.

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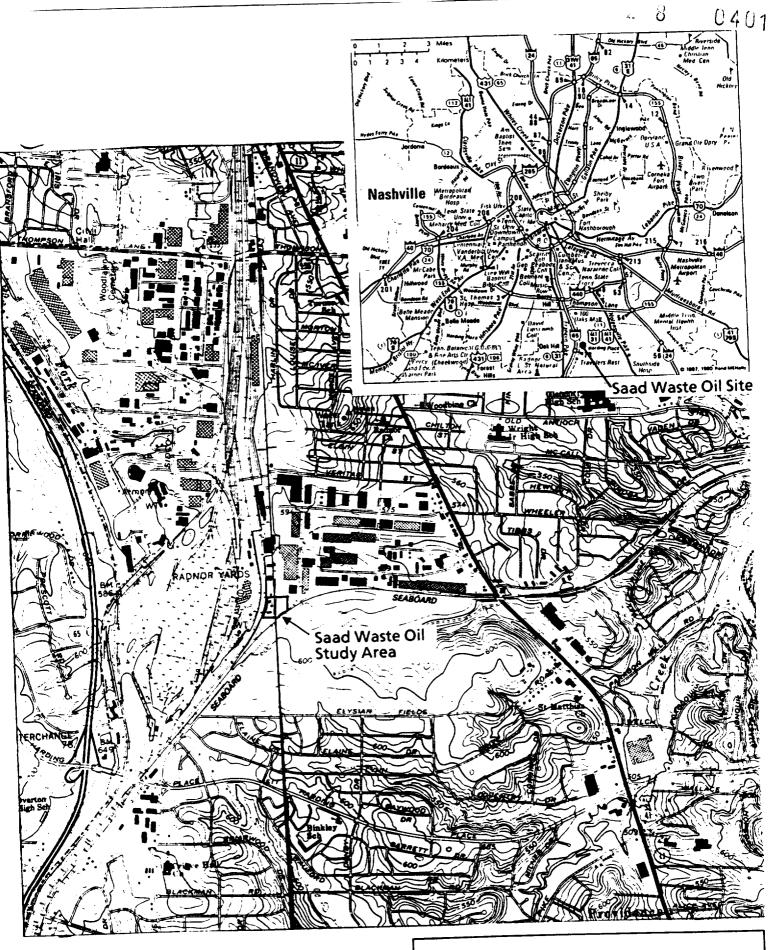
1.0 INTRODUCTION

Saad Waste Oil is the former John P.Saad Oil Company on Trousdale Blvd., Nashville TN (Figure 1). The operation began in 1970 and gained notoriety in 1978 when a pond at the west end of the site was found to contain waste solvents. Drums suspected of containing hazardous waste were found on the site in 1979.

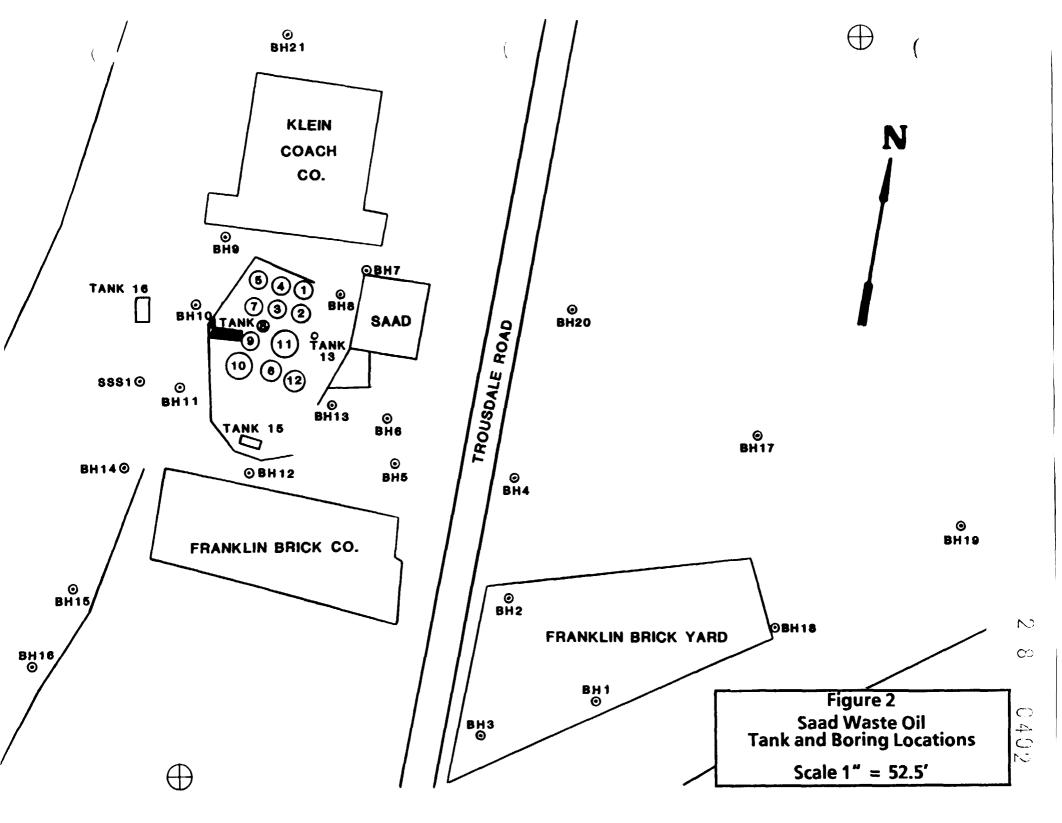
The site, underlain by the Bigby-Cannon limestone and the Hermitage formations, exhibits karstic development. The suspect pond was rumored in a sinkhole that was partially on John P. Saad Oil Company and CSX Railroad porperty. Waste oil migration through the karstic formations to a major spring (Croft Spring), potentially downgradient of the site is a potential impact from the site. The spring discharges in a planned wildlife area of the Cumberland Museum. Prior investigations concentrated on the Croft Spring, attempting to identify a hydrologic connection between Croft Spring and CSX Railroad and/or Saad Waste Oil.

An electrical resistivity study (4/82) by Ecology and Environment (E&E) identified potential solution cavities that could direct flow from Saad Waste Oil and/or CSX to the Croft Spring. Seven monitoring wells were installed to confirm the electrical resistivity survey. Five monitoring wells were installed on the Croft Farm (Cumberland Museum property) and one each on Saad and CSX properties. A sampling program was conducted by NUS Corporation during 8/82 and 9/82.

ERB/EERU initially conducted surface and groundwater sampling program at the Croft Farm, Saad Waste Oil, and CSX Railyard (6/87). A soil boring, monitoring well installation, and sampling program concentrating on the Saad Waste Oil site was performed during 3/87 (Figure 2).



Scale 1:24,000 Source: U.S.G.S. Oak Hill and Antioch, Tenn. topographic Quadrangles 7.5 Minute Series Figure 1
Site Location Map
Saad Waste Oil Site



2.0 FIELD INVESTIGATION

The Saad Waste Oil field investigation program was designed to provide: information for removal of liquids stored on site in tanks, extent and volume of waste oil contaminated soils, and assessment of groundwater contaminant migration from the site.

2.1 Tank Investigation Program

The tank investigation program was designed to provide tank fluid volumes and chemistry, to be used in a removal program (Figure 2). Three visual classifications of tank fluid phases were used: water, oil water emulsion, and oil (Table 1). Fluid volume calculations were based on the these classifications (Table 1). Several samples were composited to reduce laboratory costs and simulate removal batching (Table 2 and 3, Appendix A).

A composite sample from Tanks 1, 4, 6, 11 and Truck Tank 16 (Lab Sample No's. 5719 and 5720, Table 3) sent for laboratory analysis, represented: 2,678 gallons of oil, 170 gallons of oil/water emulsion, and 2,557 gallons of water. Fluid removal should isolate Tank 1 (completely oil) and Tank 4 (water and oil/water emulsion). Tanks 6, 11, and Truck Tank 16 should be pumped with a two phase recovery system or passed through an oil water separator.

Tank 15 (Sample 1258) contains 161 gallons of oil and 2,713 gallons of water. Recovery could be similar to Tanks 6, 11, and Truck Tank 16. Batching the oil and water samples separately from the composite of Tanks 1, 4, 6, 11, 15 and Truck Tank 16 should be relatively simple with questionable recoverability of 161 gallons of oil from Tank 15 as a separate phase. This batching would produce 2,839 gallons of oil and 5,270 gallons of water.

TABLE 1
TANK FLUID VOLUME ESTIMATES

Tank <u>Number</u>	<u>Phase</u>	Fluid Volume (gallons)	Corresp. Lab Sample Number	Comments
1	Oil	2,596	5719	Entire Volume Oil
2				Empty
3		***		Collapsed - No Access
4.	Oil/Water Emulsion Water	45 856	5719 5719	5% Oil Water-Emulsion 95% Amber Liquid
6	Water	23	5719	100% Amber liquid
10	Oil/Water Emulsion	4,270	1260	Leaking @2.5'
11	Oil Water	82 1,553	5719 5719	5% Oil 95% Amber Liquid
12	Water	840		Not Sampled
13				Empty
14				Empty
15	Oil Water	161 2,713	1258	Oil Layer 0.3' Thick
16	Oil/Water Emulsion Water	125 125	5720 5720	50% Oil Water Emulsion 50% Water
Oil Water Separator	Water Sludge	3,200 287	1261	

TABLE 2

TANK SAMPLES, KEY TO LABORATORY ANALYSIS

Lab/Chain of Custody No.	Description of Tanks Sampled	Sample <u>Date</u>
5719	Composite of Tanks: 1, 4, 6, 11 and Truck Tank 16	3/20/87
5720	Duplicate Composite of Tanks: 1, 4, 6, 11 and Truck Tank 16	3/20/87
1258	Tank 15	3/17/87
1260	Tank 10	3/18/87
1261	Oil/Water Separater Pit - Eastern Tank	3/18/87

TABLE 3 TANK SAMPLES, LABORATORY ANALYSIS SUMMARY

Courselle Double at the		(Concer	Sample I	Number ug/g unless r	oted)	
Sample Parameter	Method Blank	5719	5720	1258	1260	1261
Acetone 2-Butanone Methylene Chloride 1,1-Dichloroethane 1,1,1-Trichloroethane Trichloroethene Toluene Ethyl benzene Total xylenes 4-Methyl-2-pentanone Tetrachloroethene Pesticides/PCB's in Oil	32 31	13 3* 22 20 33 5* 9	12 19 4* 24 32 32 5* 9	1300 2900 6 43 8 68 ND	220 9 98 170 11 15 ND	ND
bis (2-Ethylhexyl) phthalate Phenanthrene Napthalene 2-M sylnaphthalene Flourene Detection Limit		21 44 110 15		1.1	474	3.9 0.11
Antimony 2.0 Arsenic 1.0 Beryllium 0.1 Cadmium 0.5 Chromium 0.4 Copper 0.5 Lead 3.5 Mercury 0.1 Nickel 0.75 Selenium 0.5 Silver 0.25 Thallium(2) Zinc 0.15		ND ND ND 0.84 7.58 28.4 574 0.28 3.3 ND ND ND	ND ND ND 0.81 7.86 27.3 728 ND 2.6 ND ND ND ND 315	ND ND ND 0.82 20.6 33.5 549 ND 1.4 ND ND ND ND 218	ND 4.9 ND 0.64 76.6 3.3 25.8 ND 4.3 ND ND ND ND 63.6	ND ND 0.66 14.1 13.7 136 ND 2.9 ND ND ND ND
Flashpoint °F % Ash BTU/pound Total Organic Halogens (1)		<7 0.31 9,350 0.20	<70 0.23 8,500 0.26	<72 0.25 0 0.09	<70 0.81 15,300 0.55	<70 0.03 500 0.09

ID

1) 2)

notes a value below the limit of quantification that is considered approximate TOX values are reported as % chlorine
Detection Limits for thallium varied due to background corrections for matrix effects
None Detected

Tank 10 was sampled separately (Sample 1260) containing 4,270 gallons of oil/water emulsion and should be treated as a separate batch. Recovery could be through simple transfer pumping with the possibility of an oil/water separator.

The site oil/water separators contain 3,200 gallons of water and 39 cubic feet of sludge. The water phase can be easily pumped, with undetermined pumpability of the sludge. Passing the discharge through an oil/water separator is advisable.

Total tank fluid volumes include: 2,839 gallons of oil, 4,440 gallons of oil/water emulsion, and 8,470 gallons of water. After tank fluid removal is complete, the remaining material should be mainly sludges. A clean up program should be developed based on consistancy of material encountered. Pressurized steam cleaning and pumping is an alternative to manually scraping the tanks.

2.2 Soil Boring and Sampling Program

The soil boring and sampling program was designed to identify the horizontal and vertical extent, chemical constituents, and volume of waste oil contaminated soil. There were 103 soil samples collected from 21 borings (Table 4). Nine soil samples, representative of the site, were collected for Volatile organic and Pesticide/PCB laboratory analysis (Tables 4, 5, 6, and Appendix A). The horizontal extent of visable oil contamination is outlined by the 2' contour on the Isopach of Oil Contaminated Soil (Figure 3). Vertical extent of contamination is identified on the soil boring logs in Appendix B. Thickness of contamination is identified by the isopach of oil contaminated soil.

Initially, the extent of contamination was estimated in the waste oil lagoon encompassing Borings BlO, Bll (Monitoring Well 11) and Well SSS1 (Figure 3). Review of an earlier field program in the Franklin Brick Yard identified potential oil contaminated soil. The soil boring plan was designed to isolate brick yard contami-

TABLE 5 PHYSICAL BOREHOLE INFORMATION

Original Numbering System	Modified Numbering System	Borehole Depth Below GS	Presence of Oil in Boring	Depth to Water Table Below GS	Ground Surface (MSL)	Bedrock Surface (MSL)
B-1 B-2 B-3 B-4 B-6 B-8 B-9 B-10 B-11 B-13 B-16 B-18 B-19 B-20 B-21 B-22 B-23 B-23 B-24 B-25 B-26 B-27	B-1 B-2 B-3 B-4 B-5 B-6 B-7 B-8 B-9 B-10 B-11 B-12 B-13 B-14 B-15 B-16 B-17 B-18 B-19 B-20 B-21	13.5' 17.5' 5'4" 9'1' 19.5' 20'2" 10.0' 4.5' 5.25' 6'4" 17'8" 10.5' 20'1" 20.0' 2.25' 3.5' 14.25' 8.5' 18.0' 15.0' 18.0'	Yes No No Yes Yes Yes Yes Yes Yes Yes Yes Yes No No No No No No No No No	7.57 15.17 - (1) 5.58 7.22 6.20 6.62' - (1) - (2) - (2) 6.65' 6.68' - 2.31 - (1) - (1) 3.46' 6.13' 17.24 4.44 6.77'	581.7 580.3 581.3 580.1 581.5 581.7 582.1 	568.20 563.10 571.02 562.0 561.53 562.10 564.53 564.53 564.95 577.90 564.95 573.30 563.80 566.10

⁽¹⁾ Borehole completed above Water Table.(2) Borehole collapse above Water Table.

TABLE 6 **VOLATILE ORGANICS A** PESTICIDE PCB'S IN SOIL Concentrations Reported In ug/kg

	Borehole/Depth Borehole/Depth										
Parameter	B-2 6.0′-7.5′	B-4 4.0'-5.0'	B-6 10.0'-13.0'	B-10 4.5'-6.0'	B-11 12.5'	B-11 14.0'	B-11 16.0'	B-14 3.0'-4.1'	B-18 6.5'-8.5'	B-18 6.5'-8.5' Duplicate	\$\$\$1 (Oil) (ug/g)
Lab Sample No.	B-2, 5-5	B-4, 4'-5'	B-8,R-1,10-13	B-13,4.5-6	B-16,R-1,2.5	B-16,R-1,14	B-16,R-2,BOB	B-20,3-4.1	B-24, R-1, 6.5'-8.5'	B-24,R-1 6.5'-8.5'	7334
Methylene Chloride			16	950		i C			38*		670
Trans-1,2-Dichloroethane	2*		8*	13,000							
2-Hexanone		1	23*	ļ		ŧ			270		
Toluene			54	29,000	53,000	100	3*	3,900			1300
Total xylenes	330	590	120	9,800	}	23		3,700			}
Acetone	22			1,200*	1,100*	340	800	810*			
Chlorobenzene		}									
Ethyl benzene	95	110		2,200*	4,600	7*		610*	380		230
2 Butanone				<u> </u>		71	96				
4 Methyl-2-pentanone	33			530*		38	49				
Benzene	5*	1			}	<u> </u>					
1,1 Dichloroethane	}	}		18,000	ļ	}				19*	130
1,1,1-Trichloroethane		ļ		28,000		1					1700
Trichloroethene		ł		930			}				4800
Tetrochloroethene				3,200		,					4800
Vinyl chloride						ł					290
Trans-1,2-dichloroethylene	9			}		[1				4200
Pesticides/PCB's (ug/g)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Aroclor 1242 (ug/l)											36
Aroclor 1260 (ug/l)						İ					17

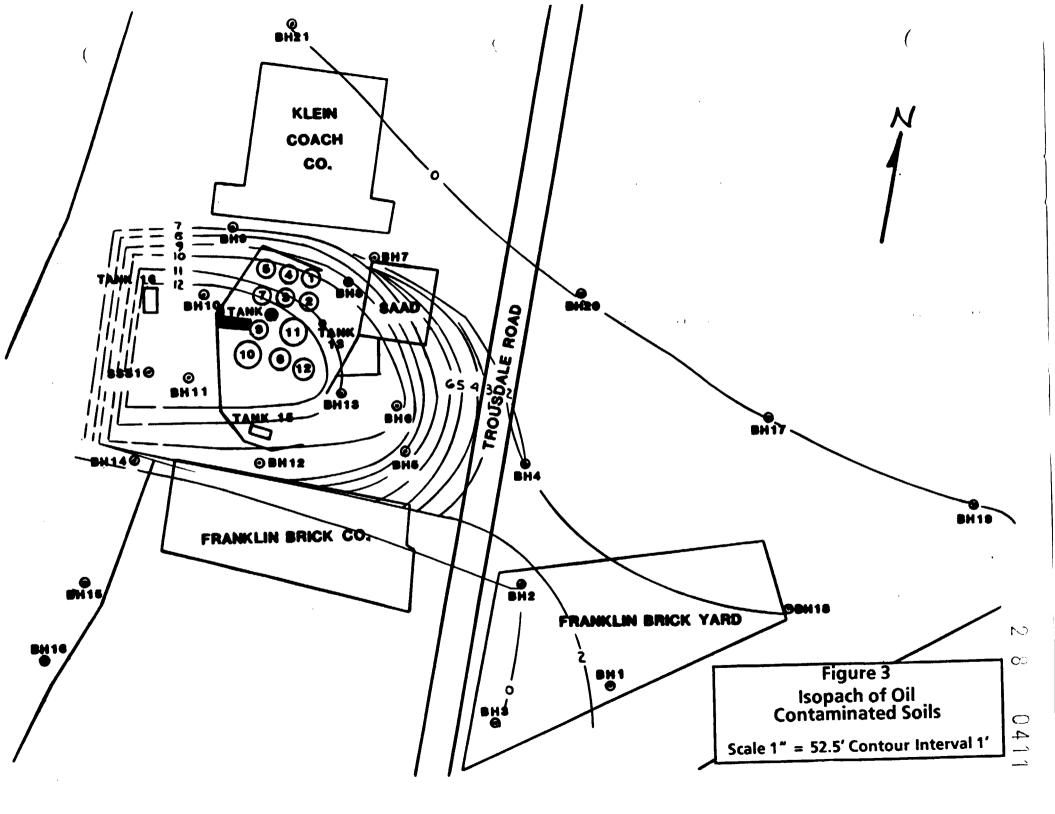
ND - None Detected *Denotes a value below the limit of quantification that is considered approximate

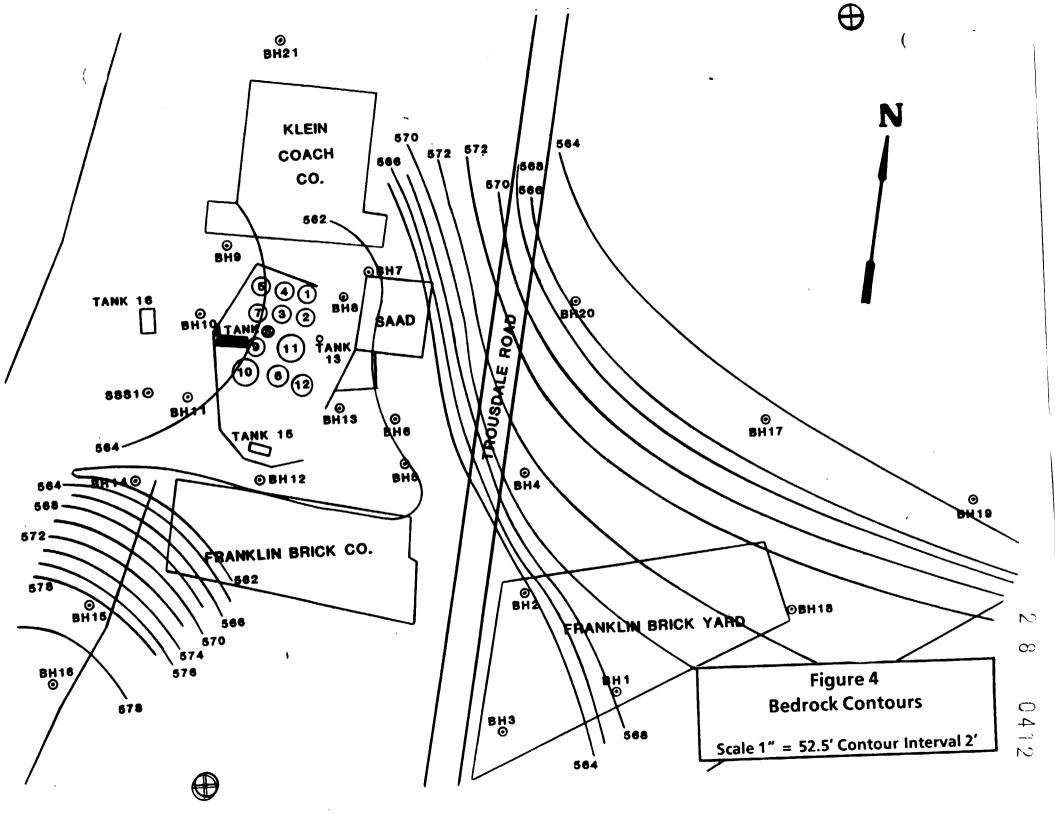
nation or connect it to oil migrating from the site. The soil boring program identifed oil contaminated soil from the site, thinning southeast to the brick yard area. (Figure 3).

Clean areas (borings with no visible oil contamination) north and east are delineated by boreholes 17, 19, 20, and 21. Clean areas to the south and west are identified by boreholes 2, 14, 15, and 16. Rail lines prohibited definition of the western and southeastern boundaries of oil contaminated soil. These clean classifications are based on visual examination of soil samples. Questionable boundaries exist at the Franklin Brick Co. office and shop building and the Klein Coach Co. building.

An isopach (Figure 3) was developed to calculate oil contaminated soil volumes. Sources for the oil contaminated soil thickness are the soil boring logs in Appendix B. The total estimate of oil contaminated soil is 9,378 yd³. This estimate does not include clean soil overlying the contaminated material. Volumes were calculated using Figure 3 and a compensating polar planimeter. The majority of waste oil contaminated soil is within site property boundaries.

Bedrock topography and waste oil contaminated soil were compared to identify possible oil migration correlations with bedrock configuration (Figure 4). Sources for the Bedrock Contour maps were boring logs in Appendix B, summarized in Table 5. Bedrock contours approximately reflect waste oil migration on the site and to the southeast. The bedrock high at boring B18 southeast of the site does not correlate with the oil migration at the soil rock interface. Boreholes 1 and 4 represent additional oil contaminated soil areas that are upgradient of the site based on bedrock topography. There is no information available west of the site.





Samples for soil chemistry analysis (Table 6, Appendix B & C) were collected with split barrel or continuous tube samplers, represented on boring logs by S and R designations, respectively. Equipment was pressure steam cleaned between samples. Split barrel samples were more reliable in obtaining a sample. However, when the continuous tube sampler worked, samples were larger and appeared less disturbed.

Volatile organic concentrations were higher in the lagoon area, represented by soil samples B-10, B-11 and oil sample SSS1. There are three compounds that may be considered markers for the site: Toluene, Total xylenes, and Ethyl benzene. Concentrations indicate migration to the southeast decreasing with distance from the proposed lagoon (B-6, 4, 2, and 18 in increasing distance from the lagoon). There were no Pesticide/PCB's identified in any soil samples, just in the soil sample from Well SSS1.

Vertical attenuation of concentrations is represented by samples collected from borehole B-11 at 12.5', 14.0', and 16.0'. Visual oil concentrations that decreased with depth were supported by laboratory analysis (Table 6).

Examination of the log for borehole 14 does not identify oil migration to the south, although volatile organic concentrations in the soil are considerable. A possible explanation is the auger refusal prohibiting sampling of borehole 14 below 4.1' or water phase contaminant transport.

An Auto Skimmer was installed in existing wells SSS-1 and MWll during the March, 1987 drilling program. The purpose of the Auto Skimmer was to determine passive recoverability of product from the Saad Site. Passive product recoverability does not use a watertable depressing pump to increase the hydraulic gradient to the well. The advantage of a passive system is no discharge from a depressant pump to be disposed of or injected back to the formation.

The Auto Skimmer is a top filling bailer that is lowered to the water table where the buoyancy of the bailer triggers an incremental lowering of the bailer. When the bailer begins filling, the buoyancy changes and the lowering process stops. After filling, the bailer is raised to the surface and emptied through an oil/water separator.

Both wells are located in the area of the reclaimed waste oil lagoon. Well SSSl is cased through the unconsolidated zone with an open borehole in rock. Well MWll is screened from approximately two feet above the water table to the soil/rock interface.

The first skimmer test was performed on Well SSS1. There was free product in the well, but an accurate thickness measurement could not be obtained. Water level paste and an EMTEC interface probe were coated by the oil and did not identify the water Approximately two gallons of oil were skimmed from the well during the initial cycles of the unit. After the initial recovery, there was no product recharge to the well during a six hour test period. All recovered product was casing storage based on initial water level measurements and displacement of two gallons of product in a 4-inch well. A possible explanation of product storage in the casing could be a seasonally fluctuating water table forcing product into the casing. There was no product recovery from a second test of similar duration.

The Auto Skimmer was installed on monitoring well MWll immediately after installation. There was an immeasurable product layer noted in the well prior to well installation. The unit operated for several hours with no product recovery.

An auto skimmer was installed in monitoring wells to experiment with passive (no drawdown pump) product recovery. There was no product recharge in the monitoring wells, eliminating passive recovery as a remedial alternative.

2.3 Groundwater

2.3.1 Site Groundwater

Boreholes from the soil boring and sampling program were used to sample and monitor site groundwater levels. If the water table was encountered, temporary screens and casing were installed in boreholes. Monitoring wells were installed in three boreholes, Bl4, 11, and 18 (Appendix D). All screens were placed above the There were ten water samples collected for volatile water table. pesticide/PCB analysis (Table organics and 7). equipment was decontaminated with successive detergent, distilled water, methanol, and distilled water rinses between samples. levels with Groundwater were measured Slope Indicator electrical tape and an EMTEC product/water measuring device. Slope Indicator worked consistantly, although the EMTEC device performed sporadically. Borehole locations and elevations were surveyed using Well SSS1 for vertical control and existing structures for horizontal control.

Groundwater flow direction and gradient was determined by creating a potentiometric groundwater surface map (Figure 5). A groundwater "trough" runs northwest to southeast through the northeast section of the site. The potentiometric map combined with the isopach of oil contaminated soil (Figure 3) correlate southeast contaminant migration. There is a possible second migration path to the northwest.

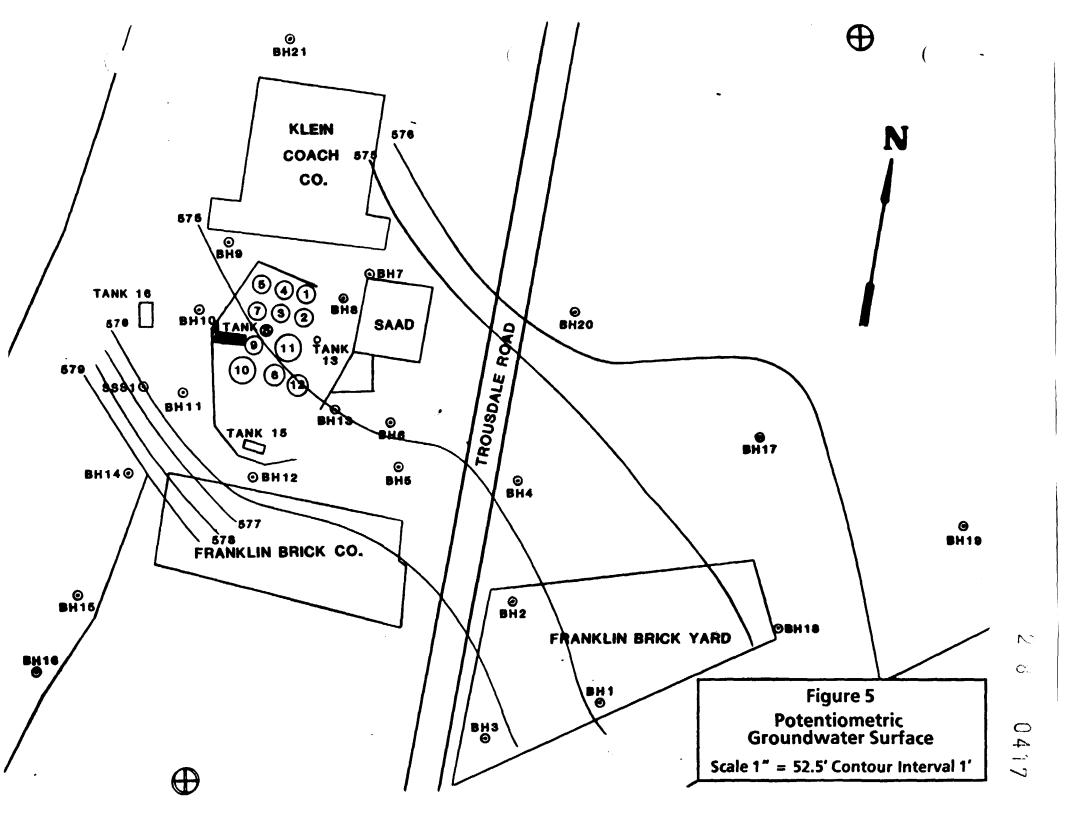
Laboratory analysis identified 5 prevalent volatile organics; 1,1 dichloroethane, trans-1,2-Dichloroethane, toluene, ethyl benzene and total xylenes (Table 7). Concentrations of each constituent are presented on Figure 6. Total xylene and ethyl benzene concentrations, two components found in gasoline, are concentrated around Trousdale Road and Franklin Brick Yard, with the exception of B-14 (W-14). Proximity to the road and an

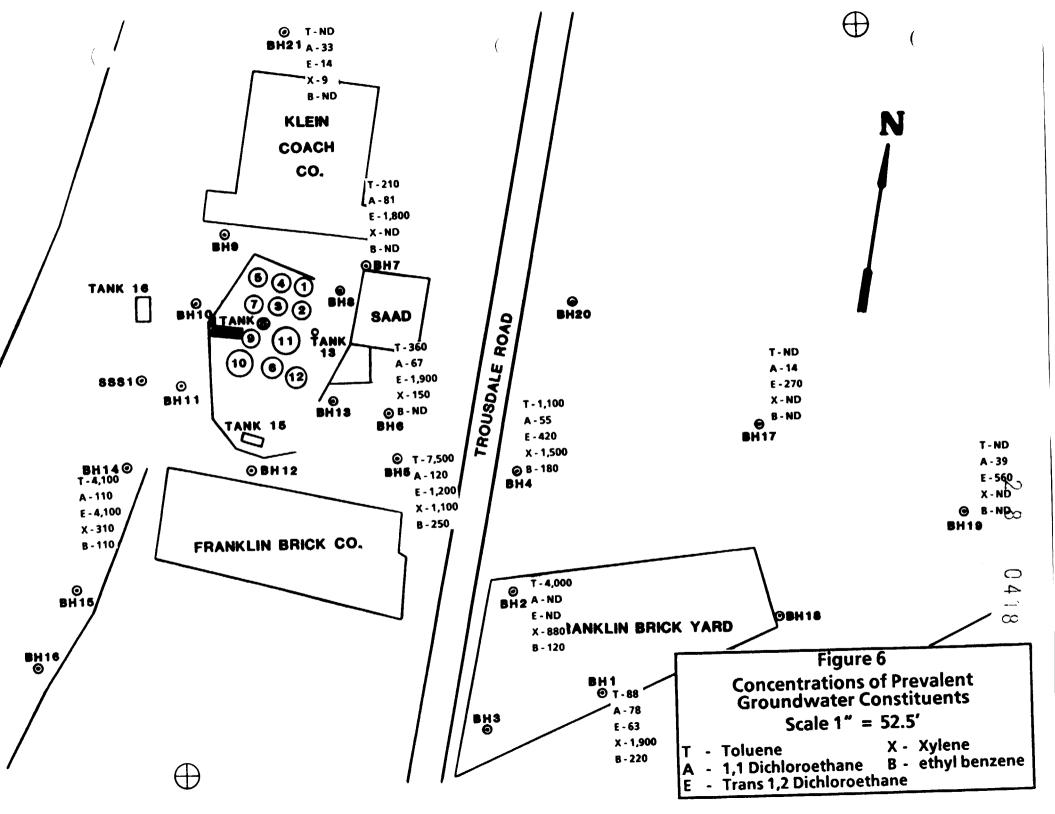
T/ _E 7 **VOLATILE ORGANICS AND PESTICIDES/PCB'S IN WATER** Concentrations Reported In ug/L

Parameter	Borehole No./Date									
	B-1 3/23/87	B-2 3/23/87	B-4 3/23/87	B-5 3/23/87	B-6 3/23/87	B-7 3/26/87	B-14 3/26/87	B-17 3/23/87	B-19 3/23/87	B-21 3/25/87
Lab Sample No.	5710	5709	5707	5705	5706	5715	5714	5708	5711	5713
Methylene Chloride				200*		53*	2500			1*
Trans-1,2-Dichloroethane	63		420	1200	1900	1800	4100	270	560	14
Chloroethane	}				[}	13
Toluene	88	4000	1100	7500	360	210	4100			
Total xylenes	1900	880	1500	1100*	150*		310			9
Acetone										68
Chloroform	}	ł	1		 			}		
Ethyl benzene	220	120*	180	1			110*			
2 Butanone	:		1		}					9*
4 Methyl-2-pentanone							210*		-	
Benzene	7*	55*	1					-		
1,1 Dichloroethane	78		55	120*	67 *	81*	110*	14	39*	33
1,1,1-Trichloroethane										8
Trichloroethene							5000			
Vinyl chloride	64		120		280	350		22	140	18
Carbon disulfide				110*						
Pesticides/PCB's	ND	ND		ND	ND	ND	ND	ND	ND	ND
4,4 - DDT			.56							

2 CO

ND - None Detected *Denotes a value below the limit of quantification that is considered approximate





underground storage tank in the brick yard may be alternate contaminent sources to the Saad site. However, these constituents were identified in on site soils analysis.

All samples have concentrations of 1,1-Dichloroethane, and trans-1,2-Dichloroethane, two common solvents. Borings B-17 and 19 are upgradient of the site, indicating possible additional sources of found groundwater contamination. Toluene is in all 17 and 19. and except upgradient boreholes borehole 21. Concentrations attenuate to the southeast with increased distance Toluene concentrations in boreholes 6 and 7 are from the site. lower than borehole 5, indicating a potential secondary migration path to the northeast. The toluene concentrations correlate with a buried "shot rock" site drain identified by local workers.

The potentiometric groundwater surface and water chemistry analysis indicate southeast and possibly northeast contaminant migration. Additional contaminant sources may exist based on results from boreholes 17 and 19, and the ethyl benzene/total xylene concentrations in samples near the Franklin Brick yard.

Hydraulic properties of the unconsolidated water table aquifer were determined by performing a single well pumping test in borehole B-6 (Appendix E). Drawdown was minimal at maximum pump capacity. Recovery occurred before any measurements could be made, limiting calculations to drawdown data. Transmissivity was 28,448 GPD/ft and hydraulic conductivity was 6.27 x 10⁻¹ cm/sec. A potential explanation for these hydraulic conditions is the gravel and boulder zones encountered in the boring program. These hydraulic conditions may be representative of a limited area with highly transmissive conditions. A higher pumping rate for an extended period of time is needed to identify these potential boundary conditions.

2.3.2 Off-Site Groundwater

A potential hydraulic connection between Saad Waste Oil and/or the CSX Railyard and the Croft Spring may be possible based on waste oil contaminated soil, site groundwater chemistry, and potentiometric water levels directed to the southeast toward Croft Spring. However, distance and the karstic nature of the bedrock prohibit any positive correlations between site contaminant migration and Croft Spring.

Examination of Croft Spring and monitoring well Volatile organic chemistry analysis (Table 8, Appendices A, C & F) do not reveal a connection between the site and Croft Spring. Base Neutral/Acid Extractable analysis reveal similar results.

The lack of corresponding laboratory results do not prove or disprove a hydraulic connection between the site and Croft Spring. The karstic nature of this bedrock aquifer offers a multitude of possible discharge mechanisms that may not have occured during sampling periods.

TÁ_ LE 8
OFF-SITE GROUNDWATER

	Sample									
Parameter	Croft Spring	Croft Spring	Croft Spring	Saad Monitoring Well	Saad Monitoring Well 9/87	Well #1 9/87	Well #2	Well #2 9/87	Well #3	Well #3 9/87
Lab Sample No.	SS-S-7-W	SS-CF-SP	7333	SS-SS-MW7	3334	7331	SS-CF-MG2	7332	SS-CF-MW3	7353
Sampling Program			3/87		3/87	3/87		3/87		3/87
1,1 Dichloroethane	21	ND	ND	1,100	1,700		ND	ND	ND	ND
Chloroform	0.5J			11						
Chlorobenzene	21									
Vinyl Chloride	}			6,600	9,800					<u> </u>
Methylene Chloride				19,000	5,500	J				ł
1,1 Dichloroethene				690						{
Chloroethane				240						}
Trans-1,2-Dichloroethane			i	95,000	52,000	1			1	
1,2 Dichloroethane				31						ł
1,1,1-Trichloroethane				15,000	6,300					
Trichloroethene	}			69,000	30,000	<5				
Benzene	}			67						
Tetrachloroethene				49,000	9,600					
Toluene				3,900	4,600					
Chlorobenzene	}			87		,				
Ethyl benzene				310	500					

ND - No VOA's detected in analysis

J - Estimated Value

3.0 CONCLUSIONS

3.1 Tank Investigation Program

The tank investigation identified 16,876 gallons of mixed; oil, oil/water emulsion, and water phase fluids stored at the site. Batching recommendations provide a simple removal scheme. Batching may be simplified if an onsite oil/water separator is used. Removal of sludges remaining after pumping is possible by pressure cleaning and/or scraping (shoveling the sludge).

3.2 Soil Boring and Sampling Program

The soil boring and sampling program identified oil contaminated soil in a much broader area than the reclaimed waste oil lagoon. The entire site is underlain by oil contaminated soil with southeast oil migration to the Franklin Brick Company property. The majority of the estimated 9,378 yd³ of oil contaminated soil is on Saad Waste Oil property.

Volume and exent of contamination make soil removal difficult. Extensive overburden off site and a groundwater table above the bottom of waste throughout make removal unrealistic.

There are two remedial methods (or combinations) that prohibit further waste oil migrations. The first alternative could be capping the site with an impermeable material to prevent The water table in contaminated soils infiltration (asphalt). necessitates a slurry wall or cutoff trench to inhibit off-site contaminant migration from groundwater flow through the site. Spatial limitations virtually eliminate slurry wall or cutoff trench construction. A second alternative could be in-situ stabilization of oil contaminated soil using pressure grouting techniques.

3.3 On_Site Groundwater

The groundwater potentiometric surface and laboratory analysis indicate flow primarily to the southeast and possibly to the northwest. High transmissivity of the oil contaminated zones (gravel layers) could provide a rapid contaminant transport system if not for the low groundwater gradient and inconsistency of materials encountered.

Remedial alternatives discussed in the Soil Boring section could effectively inhibit leaching and migration of contaminants by groundwater. When choosing a remedial alternative, downward vertical contaminant migration on and off site should be considered.

3.4 Off-Site Groundwater

The soil boring and on-site groundwater monitoring program identify contaminant migration to the southeast, the direction of Croft Spring. However, offsite groundwater samples including Croft Spring do not identify contaminant transport. This does not eliminate site contamination of Croft Spring, but requires further investigation into contaminant pathways. Injection of tracers to determine flow paths is premature until there is a better understanding of contaminant transport.

APPENDIX A

ANALYTICAL RESULTS, TANK SAMPLINGS, SITE SOIL, AND SITE GROUNDWATER

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201-548-9660

SAAD WASTE DIL SITE Nashville, TN Project No. 37069190499 July 29, 1987

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INTRODUCTION

On March 20, 1987, five oil samples were sent to Versar Laboratory in Virginia from the Saad Waste Oil Site in Nashville, Tennessee. Priority pollutant volatile organics, FCBs, pesticides, base-neutral/acid extractables, and metals plus, incineration parameters (TOX, BTU, ash, and ignitability) analyses were performed. On March 23, seven water samples and ten soil samples were submitted to Versar for priority pollutant volatile organics and pesticides/FCBs analyses. Sample No. B-16,R-2 BOB is erroneously listed on the chain of custody records as a water sample; it is in fact a soil sample.

ANALYTICAL PROCEDURES

WATER

Volatile Organics: The volatile organics analyses were conducted according to Contract Laboratory Program (CLP) protocols. samples required dilution due to high concentrations of the parameters of interest. The method blanks for these analyses contained methylene chloride and acetone. The background for these compounds was subtracted from samples showing a positive response. Results are presented in Table 1. CLP criteria for calibration linearity were met for all compounds. Instrument detection limits were also acceptable. Detection limits varied for these samples due to the dilutions. Detection limits for each sample can be located in They are provided in the form of GLP sample reporting Section III. Also included in this section are the listings of data sheets. tentatively identified compounds. These compounds do not meet CLP criteria for identification and should be used with discretion.

Pesticides/FCBs: The pesticides/FCB analyses were conducted according to EPA Method 608 of the Federal Register. Results are presented in Table 2. All samples were analyzed as low level and met all detection limit criteria established by CLP. FCBs were undetected in all samples. 4,4'-DDT was found in sample 5707 but the chromatography was poor on both columns and Versar strongly suggests that this may be a false positive. In addition, since the linearity of DDT exceeded CLP limits, this result is somewhat questionable. No results are reported for sample 5708. The original analysis of the water samples indicated "overactivated" sorbent was used to clean the sample extracts and the extraction and analysis of the samples were repeated. Sample 5708 was expended during the initial analysis. The holding times for the extraction of the samples was exceeded.

SOILS

Volatile Organics: These analyses were conducted according to CLP

protocols. The soils contained various levels of volatile compounds and detection limits varied accordingly. The detection limits for each sample are provided in Section IV in the form of CLP data sheets. Also included in this section are listings of tentatively identified compounds. These compounds do not meet CLP criteria for identification and should be used with discretion. All compounds met CLP standards for calibration linearity and detection limits. The results are presented in Table 3.

Pesticides/PBCs: Samples were prepared and analyzed according to EPA Method 8080. Festicides and PCBs were undetected in these samples. Results are presented in Table 4.

DILS

Volatile Organics: Samples were prepared by diluting one gram of oil in one milliliter of methanol. Sample extracts were analyzed by direct injection of a 1 ul aliquot onto the column to the GC/MS. The methanol blank contained acetone and 2-butanone. This background was subtracted from any sample hits for these compounds. Calibration range linearity was within CLP limits for all compounds except acetone and 2-butanone, probably due to the presence of these compounds in the methanol. In addition, the concentration of acetone and 2-butanone in Sample 1258 exceeded the linear calibration range and should be considered approximate. Redilution of this sample was not possible since only a small oil layer was present in the sample container and it was expended during the initial dilution. Results are presented in Table 5. Section V contains a listing of tentatively identified compounds. These compounds do not meet CLP criteria for identification and should be used with discretion.

Pesticides/PCBs: The samples were prepared and analyzed according to EPA Method 8080. Festicides and PCBs were undetected in these samples as shown in Table 6. Linearity criteria as established by CLF were not met for alpha-BHC, delta-BHC, gamma-BHC, aldrin, 4,4'-DDT and methoxychlor. All other parameters were within the CLF limits. Detection limits were also met. Results are presented in Table 5.

Base Neutral/Acid Extractables: The samples were prepared according to EPA Method 8270. Sample analyses were conducted according to CLP protocol. All detection limit and linearity criteria were met with the exception of benzoic acid. Linearity for this compound exceeded the 35% relative standard deviation limit. Results are presented in Table 7. Section IX contains a list of tentatively identified compounds. These compounds did not meet CLP criteria for identification and should be considered as marginally accurate. Sample 1261 was analyzed in triplicate. Phenanthrene was detected in one of the three analyses. Bis(2-ethylhexyl)phthalate was detected in two of the three analyses. The analysis of one 1261 sample did not confirm the presence of either compound but GC/MS data for tentatively confirmed compounds indicate that they may be present. The analysis of these samples was complicated due to high

concentrations of numerous hydrocarbons which created background interferences.

Metals: Samples were analyzed according to EPA Methods 6010, 7060, 7470, and 7740 for priority pollutant metals. All calibration and linearity criteria were met. Results are presented in Table 8.

The results of the incineration parameter testing are presented in Table 9.

Table 1. Volatile Organics in Water

Concentrations reported in ug/L

ample No.	Parameter	Concentration
705	Methylene chloride	200.*
Diluted 100x)	Carbon disulfide	110.*
	1,1-Dichloroethane	120.*
	trans-1,2-Dichloroethene	1200.
	Toluene	7500.
	Ethyl benzene	250.*
	Total xylenes	1100.*
5706	Vinyl chloride	280.
Diluted 20x)	1,1-Dichloroethane	67.*
•	trans-1,2-Dichloroethene	1900.
	Toluene	360.
	Total xylenes	150.*
5707	Vinyl chloride	120.
(Diluted 10x)	1,1-Dichloroethane	55.
	trans-1,2-Dichloroethene	420.
	Toluene	1100.
	Ethyl benzene	180.
	Total xylenes	1500.
5708	Vinyl chloride	22.
(Diluted 2x)	1,1-Dichloroethane	14.
	trans-1,2-Dichloroethene	270.
570 9		
(Diluted 50x)	Benzene	55 . *
	Toluen e	4000.
	Ethyl benzene	120.*
	Total xylenes	880.
5710	Vinyl chloride	64.
(Diluted 5x)	1,1-Dichloroethane	78.
	trans-1,2-Dichloroethene	63.
	Benzene	7.*
	Toluene	88.
	Ethyl benzene	220.
	Total xylenes	1900.

^{*}denotes a value below the limit of quantification that is considered approximate.

Table 1. Volatile Organics in Water (Cont'd)

Concentrations reported in ug/L

Sample No.	Parameter	Concentration	
5711	Vinyl chloride	140.	
(Diluted 10x)	1,1-Dichloroethane trans-1,2-Dichloroethene	39. * 560.	
5712	Methylene chloride	1.*	
	Chloroform	2.*	
	1,1,1-Trichloroethane	2.*	
	Trichloroe thene	2.*	
571 3	Vinyl chloride	18.	
	Chloroethane	13.	
	Methylene chloride	1.*	
	Acetone	68.	
	1,1-Dichloroethane	33.	
	trans-1,2-Dichloroethene	14.	
	2-Butanone	9.*	
	1,1,1-Trichloroethane	8.	
	Total xylenes	9.	
5714	Methylene chloride	2500.	
(Diluted 50x)	1,1-Dichloroethane	110.*	
	trans-1,2-Dichloroethene	4100.	
	Trichloroethene	5000.	
	4-Methyl-2-pentanone	210.*	
	Toluene	4100.	
	Ethyl benzene	110.*	
	Total xylenes	310.	
5715	Vinyl chloride	3 5 0.	
(Diluted 25x)	Methylene chloride	53.*	
_	1,1-Dichloroethane	81.*	
•	trans-1,2-Dichloroethene	1800.	
	Toluene	210.	

^{*}denotes a value below the limit of quantification that is considered approximate.

Table 2. Results of Pesticides/PCBs in Water

Concentrations reported in ug/L

•	Parameter	
Method Blank	None detected	~-
5705	None detected	~
5706	None detected	
5707	4,4'-DDT	.56
5708	None detected	
5709	None detected	
5710	None detected	
5711	None detected	
5712	None detected	
571 3	None detected	
5714	None detected	·
5715	None detected	

Table 3. Volatile Organics in Soil
Concentrations reported in ug/kg

Sample No.	Parameter	Concentration
B-8 R1 10-13	Methylene chloride	16.
(Diluted 2x)	trans-1,2-Dichloroethene	8.*
	2-Hexanone	23.*
	Toluene	54.
	Total xylenes	120.
B-20 3-4.1	Acetone	810.*
(Diluted 100x)	Toluene	39 00.
	Ethyl Benzene	610.*
	Total Xylenes	3700.
B-16 R1-14	Acetone	340.
(Diluted 2x)	2-Butanone	71.
	4-Methyl-2-pentanone	38.
	Toluene	100.
	Ethyl benzene	7.*
	Total xylenes	23.
B-16 R2 BOB	Acetone	800.
	2-Butanone	96.
	4-Methyl-2-pentanone	49.
	Toluene	3.*
B-2 S-5	Acetone	22.
	trans-1,2-Dichloroethene	2.*
	Benzene	5.*
	4-Methyl-2-pentanone	33.
	Ethyl benzene	95.
	Total Xylenes	330.
B-4 4'-5'	Ethyl benzene	110.
(Diluted 2x)	Total xylenes	59 0.
B-16 R1 2.5	Acetone	1100.*
(Diluted 250x)	Toluene	53000.
	Ethyl benzene	4600.

^{*}denotes a value below the limit of quantification that is considered approximate.

Table 3. Volatile Organics in Soil (Cont'd)

Concentrations reported in ug/kg

Sample No.	Parameter	Concentration
B-35 S-2 6.5-8.5 (Diluted 10x)	1,1-Dichloroethane	19.*
B-24 R1 6.5-8.5 (Diluted 10x)	Methylene chloride 2-Hexanone Ethyl benzene	38.* 270. 380.
B-13 4.5-6 (Diluted 100x)	Methylene chloride Acetone 1,1-Dichloroethane trans-1,2-Dichloroethene 1,1,1-Trichloroethane Trichloroethene 4-Methyl-2-pentanone Tetrachloroethene Toluene Ethyl benzene Total xylenes	950. 1200.* 18000. 13000. 28000. 930. 530.* 3200. 29000. 2200.*

*denotes a value below the limit of quantification that is considered approximate.

Table 4. Pesticides/PCBs in Soil
Concentrations reported in ug/g

Sample No.	Parameter	Concentration
B-2 S-5	None detected	
B-4 4-5	None detected	~-
B-8 R-1 10-13	None detected	
B-13 4.5-6	None detected	
B-16 R-1 2.5	None detected	
B-16 R-2 BOB	None detected	
B-16 R-1 14	None detected	
B-20 3-4.1	None detected	
B-24 R-1 6.5-8.5	None detected	
B-35 S-2 6.5-8.5	None detected	

Table 5. Volatile Organics in Oil Concentrations reported in ug/g

Sample		Parameter	Concentration
Method		Acetone	32.
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		2-Butanone	31.
5719		Methylene chloride	13.
		1,1-Dichloroethane	3.★
		1,1,1-Trichloroethane	22.
		Trichloroethene	20.
		Tetrachloroethene	2.*
		Toluene	33.
		Ethyl benzene	5.*
		Total xylenes	9.
5720		Methylene chloride	19.
		1,1-Dichloroethane	4.*
		2-Butanone	12.
		1,1,1-Trichloroethane	24.
		Trichloroethene	32.
		Toluene	32.
		Ethyl benzene	5.*
		Total xylen es	9.
1258		Methylene chloride	6.
		Acetone	1200.
		2-Butanone	2900.
		Trichloroethene	43.
		4-Methyl-2-pentanone	68.
		Toluene	8.
1260		Methylene chloride	220.
		1,1,1,-Trichloroethane	9.
		Trichloroethene	98.
	•	4-Methyl-2-pentanone	15.
		Toluene	170.
		Total xylenes	11.
1261		None detected	

^{*}denotes a value below the limit of quantification that is considered approximate.

Table 6. Results of Pesticides/FCBs in Oil
Concentrations in ug/g

Sample No.	Parameter	Concentration
1258	None detected	
1258 (Duplicate)	None detected	
1260	None detected	
1261	None detected	
5719	None detected	40.40
5720	None detected	

Table 7. Results of Base Neutral/Acid Extractables in Oils

Concentrations reported in ug/g

Sample No.	Farameter	Concentration
Method Blank	None detected	~-
1258	None detected	~-
1260	bis(2-Ethylhexyl)phthalate	474.
1261	bis(2-Ethylhexyl)phthalate	1.1
1261 (Duplicate 1)	None detected	
1261 (Duplicate 2)	Phenanthrene bis(2-Ethylhexyl)phthalate	0.11* 3.9
5719	Naphthalene 2-Methylnaphthalene Phenanthrene Fluorene	44. 110 21. 15.
5720	None detected	-00-400

^{*} denotes a response that is below the limit of quantification and considered approximate.

Table 8. Results of Metals in Oil Analysis

Concentrations reported in ug/g

Parameter	Concentration					
	Detection Limit	5719	5720	1258	1260	1261
Antimony Arsenic Beryllium Cadmium Chromium Copper Lead Mercury Nickel Selenium Silver	2.0 1.0 0.1 0.5 0.4 0.5 3.5 0.1 0.75 0.5	ND ND 0.94 7.58 28.4 574. 0.28 3.3 ND ND	ND ND 0.81 7.86 27.3 728. ND 2.6 ND	ND ND 0.82 20.6 33.5 549. ND 1.4 ND	ND 4.9 ND 0.64 76.6 3.3 25.8 ND 4.3 ND	ND ND 0.66 14.1 13.7 136. ND 2.9 ND
Thallium Zinc	* 0.15	ND 304.	ND 315.	ND 218.	ND 63.6	ND 147.

^{*}Detection limits for thallium varied due to background corrections for matrix effects.

Table 9. Incineration Testing for Oil

Flashpoint oF	% Ash	BTU/ pound	Total organic Halogens*
<70	0.31	9350	0.20
<70	0.23		0.26
₹72	0.25	0	0.09
<70	0.81	15300.	0.55
<72	0.03	500.	0.09
	oF <70 <70 <72 <70	oF <70 0.31 <70 0.23 <72 0.25 <70 0.81	oF pound <70 0.31 9350. <70 0.23 8500. <72 0.25 0 <70 0.81 15300.

^{*}TOX values reported as % chlorine.

QA/QC PROCEDURES

Volatile Organics: All water, soil and oil samples were spiked with three surrogate standards. In the case of water and soil samples, these surrogate standards were used to assure the efficiency of the purge and trap unit. For the oil samples, the surrogates were used to establish the extraction efficiency. The surrogate standard recoveries are presented in QA/QC Table 10. All recoveries were within CLP advisory limits.

Two water samples were spiked in duplicate with a five component volatile organics mixture to determine the presence of any matrix interferences. All compounds were within the advisory limits established by CLP. Results are presented in QA/QC Table 11.

One soil sample and one oil sample were spiked with a five component volatile organics mixture. All recoveries were within CLP advisory limits. Results are presented in QA/QC Table 12 for the soil sample and QA/QC Table 13 for the oil.

Pesticides/PCBs: All water, soil and oil samples were spiked with a surrogate standard, dibutylchlorendate, to assure extraction efficiency. These results are presented in QA/QC Table 14. One water sample, 5706, showed a low recovery of 23%. The laboratory provided no possible cause. The soil samples showed recoveries in excess of 150% for 9 out of 12 analyses. The analysis of the soil samples for volatile organics by GC/MS indicated elevated concentrations of hydrocarbons which are the most likely reason for the high surrogate recoveries for the pesticides. The oil samples also showed high recoveries for samples 1260, 1261, 5719, and 5720.

Two water samples, 5712 and 5709, were spiked in duplicate with a three component mixture of pesticides. Five of six recoveries for these compounds in sample 5712 exceeded the CLP advisory limits. Six of six recoveries for sample 5709 exceeded 200%. The laboratory suggested that this sample may have been "double spiked". These results are presented in QA/QC Table 15.

One soil sample, B-16 R-2 BOB, was spiked with a six component pesticide mixture. All recoveries were within the CLP advisory limits except 4,4'-DDT which had a 155% recovery. The linearity of the 4,4'-DDT was unacceptable throughout these analyses. The results are presented in QA/QC Table 16.

One oil sample, 1258, was spiked with a six component pesticide mixture. Again, all recoveries, except 4,4'-DDT, were within CLP advisory limits. The results are reported in QA/QC Table 17.

No FCB matrix spikes were performed.

Base Neutral/Acid Extractables: The oil samples were spiked with three base neutral surrogate standards and three acid surrogate standards. The recoveries were within CLP advisory limits for all surrogates in all samples except sample 5719. Sample 5719 showed elevated recoveries for all but one surrogate. These results are presented in QA/QC Tables 18A and 18B.

Metals: One oil sample, 1261, was analyzed in duplicate to determine matrix homogeneity. The relative percent differences for all detected metals were less than 10 as presented in QA/QC Table 20.

Sample 5720 was spiked with 1.0 ug/g mercury to determine any matrix effects. The recovery was 50% possibly due to complexing of the mercury with chlorides during sample digestion. The volatile organics analysis for this oil sample confirmed the presence of organochlorine compounds (See Table 5 of Section I, Results). Sample 5719 was spiked with arsenic and selenium and showed recoveries of 104% and 114%, respectively. Sample 1260 was spiked with a mixture of the ten remaining priority pollutant metals. All recoveries were within a range of 60%-125% except silver which had a recovery of 53%. This sample contained high concentrations of organochlorine compounds, possibly resulting in complexing of the silver and chlorine during digestion with subsequent precipitation. The results of these matrix spikes are presented in QA/QC Table 21.

QA/QC Table 22 presents the results of duplicate incineration parameters analyses. The relative percent differences did not exceed 15. The flashpoint testing was not performed in duplicate.

QA/QC Table 10. Surrogate Standard Recoveries for Volatile Organics in Water, Soil, and Oil

	Toluene-D8		% Recovery 1,2-Dichloroethane-D4
Water:			
5 705	101	104	92
5 706	101	101	96
5 707	98	98	93
5708	98	102	87
5708 (MS)	96	9 9	89
5708 (MSD)	93	100	91
5 70 9	98	99	88
5 710	· 98	100	90
5711	98	103	92
5712	101	107	92
5 713	102	108	92
5713 (MS)	<i>9</i> 8	101	94
5 713 (MSD)	9 7	99	96
5714	99	98	88
5715	97	98	91
Soil:			
B- 2 S- 5	100	89	96
B-4 4-5	108	100	108
B-8 R-1 10-1		107	95
B-13 4.5-6	102	102	122
B-16 R-1 2.5		98	89
B-16 R-2 BOB (Dil 5X)	101	97	94
B-16 R-2 BOB	103	100	101
B-16 R-1 14		102	111
B-20 3-4.1	105	103	119
B-24 R-1	101	134	115
B-35 S-2	102	109	92
B-2 S-5 (MS)	96	93	80
B-2 S-5 (MSI)) 9 9	94	81 .
Oil:			
1258	95	107	105
1260	95	106	106
1261	92	105	109
5719	101	100	109
5719 (MS)	98	103	108
5719 (MSD)	98	106	106
572 0	95	106	106

QA/QC Table 11. Matrix Spike/Matrix Spike Duplicate Recoveries for Volatile Organics in Water

Concentrations reported in ug/L

All parameters spiked at 50 ug/L

Parameter	Sample	Recov MS	er ed MSD	% Red MS	msD	RPD
Sample No. 5708						
1,1-Dichloroethene	ND	33	32	66	64	3.1
Trichloroethene	ND	47	44	94	88	6.6
Chlorobenzene	ND	44	43	88	86	2.3
Toluene	ND	44	42	88	84	4.6
Benzene	ND	43	39	86	78	9.8
Sample No. 5713						
1,1-Dichloroethene	ND	49	49	98	98	0
Trichloroethene	ND	50	50	100	100	0
Chlorobenzene	ND	49	48	98	96	2.0
Toluene	ND	50	50	100 -	100	O
Benzene	ND	48	48	96	96	0

MS denotes matrix spike. MSD denotes matrix spike duplicate.

RPD denotes relative percent difference.

QA/QC Table 12. Matrix Spike/Matrix Spike Duplicate Recoveries for Volatile Organics in Soils

Concentrations reported in ug/kg

All parameters spiked at 50 ug/kg

Parameter	Sample Conc.	Recov Con		% Reco	overy	RPD
		MS	MSD	MS	MSD	
Sample B-2 S-5 1,1-Dichloroethene Trichloroethene Chlorobenzene	ND ND ND	65. 53. 45.	67. 55. 52.	130 106 90.	134 110. 104	3.0 3.7 14.
Toluene Benzene	ND 5.*	45. 44.	49. 48.	90. 78.	98. 86.	8.5 11.

MS denotes matrix spike. MSD denotes matrix spike duplicate.

RPD denotes relative percent difference.

^{*} denotes a value that is below the limit of quantification and considered approximate.

QA/QC Table 13. Matrix Spike/Matrix Spike Duplicate Recoveries for Volatile Organics in Oil

Concentrations reported in ug/g

All parameters spiked at 100 ug/g

Parameter	Sample Conc.		vered	% Reco	very	RPD
		MS	MSD	MS	MSD	
Sample No. 5719						
1,1-Dichloroethene	ND	112	116	112	116	3.5
Trichloroethene	20.	118	12 9	98	109	11.
Chlorobenzene	ND	98	78	98	98	o
Toluene	33.	125	133	92	100	8.3
Benzene	ND	97.	100.	97.	100	3.0

MS denotes matrix spike, MSD denotes matrix spike duplicate.

RPD denotes relative percent difference.

QA/QC Table 14. Surrogate Standard Recoveries for Pesticides/PCBs in Water, Soil and Oil

Sample No.	Matrix	% Recovery Dibutylchlorendate
5705	Water	31.
5706	Water	23.
5707	Water	120
5709	Water	70
5709 MS	Water	120
5709 MSD	Water	129
5710	Water .	46
5711	Water	20
5712	Water	100
5712 MS	Water	100
5712 MSD	Water	100
5713	Water	30
5714	Water	70
5715	Water	50
B-2 S-5	Soil	190
B-4 4-5	Soil	560
B-8 R-1 10-13	Soil	320
R-13 4.5-6	Soi l	300
B-16 R-1 2.5	Soi l	110
B-16 R-2 BOB	Soi l	110
B-16 R-1 14	Soil	170
B-20 3-4.1	Soi l	350
B-24 R-1 6.5-		930
B-35 S-2 6.5 -		1380
B-16 R-2 B OB		130
B-16 R-2 BOB	(DUP) Soil	230
1258	Oil	100
1258 Duplicāt		110
1258 MS	Oi l	100
1260	Oil	320
1261	Oil	550
5719	Oi l	270
5720	Oil	1330

MS denotes matrix spike, MSD denotes matrix spike duplicate. DUP denotes duplicate.

QA/QC Table 15. Matrix Spike/Matrix Spike Duplicate Recoveries for Pesticides in Water

Concentrations reported in ug

All parameters spiked with .5 ug

Parameter	Sample Recovered Conc. Conc.		% Recovery		RPD	
		MS	MSD	MS	MSD	
Sample No. 5712						
Dieldrin	ND	.62	.63	124	126	3.2
Endrin	ND	.74	.78	148	156	5.3
4,4'-DDT	ND	. 93	. 79	186	158	16.3
Sample No. 5709						
Dieldrin	ND	1.1	1.2	220	240	9.0
Endrin	ND	1.3	1.4	260	280	7.0
4,4'-DDT	ND	1.2	1.2	240	240	O

MS denotes matrix spike, MSD denotes matrix spike duplicate. RPD denotes relative percent difference. ND denotes not detected.

QA/QC Table 16. Matrix Spike Recoveries for Pesticides in Soil

Concentrations reported in ug

			·	
Farameter	Sample Conc.	Spike Conc.	Recovered Conc.	% Recovery
Sample No.	B-16 R-2 BOB			
gamma-BHC	ND	0.80	0.78	98.
Heptachlor	ND	0.80	o.78	98.
Aldrin	ND	0.80	o.78	98. .
Dieldrin	ND	2.0	. 2.0	100.
Endrin	ND	2.0	2.2	110.
4,4'-DDT	ND	2.0	3.1	155.

QA/QC Table 17. Matrix Spike Recoveries for Pesticides in Oil

Concentrations reported in total ug

Parameter	Sample Conc.	Spike Conc.	Recovered Conc.	% Recovery
Sample No. 1258				
Lindane	ND	2.0	2.2	110
Hep tachlor	ND	2.0	1.9	95
Aldrin	ND	2.0	2.3	115
Dieldrin	ND	5.0	6.1	122
Endrin	ND	5.0	6.2	124
4,4"-DDT	ND	5.0	7.6	154

QA/QC Table 18A. Surrogate Standard Recoveries for Base Neutral ~xtractables

ample No.	% Recovery Nitrobenzene-D4	%Recovery 2-Fluorobiphenyl	% Recovery p-Terphenyl-D14
1258	88.	60	 78
1260	83	59	68
1261	89	69	65
1261 Dup	95	90	64
1261 MS	92	84	56
5719	316	180	220
5720	94	63	82

PA/QC Table 18B. Surrogate Standard Recoveries for Acid Extractables

79.	80.	86
7 9.	79.	81
87.	85.	95
80.	78	95
. 90.	81.	102.
148.	208.	122.
89.	89.	84.
	79. 87. 80. . 90. 148.	79. 79. 87. 85. 80. 78 . 90. 81. 148. 208.

MS denotes matrix spike.

QA/QC Table 19. Matrix Spike Recoveries for Base Neutral/Acid Extractables in Oil

Concentrations reported in ug/ml

Parameter	Sample Conc.	Spike Conc.	Recovered Conc.	%Recovery
Sample 1261				
1,2,4-Trichlorobenzene	ND	100.	80.	80.
Acenapthene	ND	100.	77.	77.
2,4-Dinitrotoluene	ND	100.	97.	97.
Pyrene	ND	100.	55.	55.
N-nitrosodi-n-propylamine	ND	100.	68.	68.
1,4-Dichlorobenzene	ND	. 100.	61.	61.
Pentachlorophenol	ND	200.	192	96.
Phenol	ND	200.	131	66.
2-Chlorophenol	ND	200.	132	66.
4-Chloro-3-methylphenol	ND	200.	161	80.
4-Nitrophenol	ND	200.	162	81.

QA/QC Table 20. Duplicate Metals in Oil Analyses Concentrations reported in ug/g

Parameter	Run 1	Run 2	RPD	
Sample No	o. 1261			
Antimony	ND	ND		
Beryllium	ND	ND		
Cadmium	0.66	0.66	o	
Chromium	14.1	15.	6.2	
Copper	13.7	14.	2.2	
Lead	136.	134.	1.5	
Nickel	2.9	2.7	7.1	
Silver	ND	ND		
Thallium	ND	ND	with time	
Zinc	147.	146.	0.7	

RPD denotes relative percent difference. ND denotes not detected.

QA/QC Table 21. Matrix Spike Recoveries for Metals in Oil

Concentrations in ug/g

Parameter	Sample	Spike	Recovered	%
	Conc.	Conc.	Conc.	Recovery
Sample No	1260			
Antimony	ND	100.	67.8	67.8
Beryllium	ND	50.	46.7	93.4
Cadmium	0.64	50.	37 .5	73.7
Chromium	76.6	50.	139	125
Copper	3.3	100.	91.1	87.8
Lead	25.8	100.	89 .4	63.6
Nickel	4.3	100.	84.7	80.4
Silver	ND	50.	26.6	53.2
Thallium	ND	100.	73.4	73.4
Zinc	63.6	100.	158.	94.4
Sample N	No. 5719			
Arsenic	αи	2.5	2.6	104
Selenium	ND	5.0	5. 7	114
Sample N	No. 5720			
Mercury	ND	1.0	.5	50.

ND denotes not detected.

QA/QC Table 22. Duplicate Analyses for Incineration Parameters

% Ash 1258	0.27	0.24	0.03	12.
TOX (% as Cl) 1260	0.55	0.57	0.02	3.6
BTU/pound 1260	15,300	15,300	0.0	0.0

RPD denotes relative percent difference.

FORM NO. 1541-2

ENVIRESPONSE, INC. CHAIN OF CUSTODY RECORD PROJECT NAME Sand Oil Site SAMPLER(S) SIGNATURE PROJECT NO __370 VOLUME TO BE COLLECTED TIME COLLECTION COMPLETED SAMPLE TYPE TIME NO OF CONTAINERS SAMPLE SAMPLING LOCATION DATE' COMMENTS SAMPLED IDENTIFICATION ATERSOLID AIR OIL BEGAN VOA, PESTICIDES/PCB, PD 3/20/67 B24 6.5-8.5 X80E MALYZE CONTAMINATED PORTION 4.5-6 B 13 1×802 3/20/87 6.5'-8.5' B35 /x 802 3/20/57 05705 BL 3/23/87 ZXIL VOA 3 05705 Bb 3x40ml PP, PESIKUE / PCB B8 2 05706 JYIL 3/23/87/ VOA BY 13x46mL PP, PESTICIDE PCB 05706 B4 2Y/L VOA 3/23/87 05707 3 BY 3x40mL 05707 PP, PESTICIDE PCB B23 7×11 VO A 05708 3/23/27 05768 3x4674 B23 PP. PESTICIDE PCB. 3/23/57 N ∞ Cond Wassuchets DATE / TIME 3/24/87 09ec DATE / TIME 3/23/4 7 /445 RECEIVED BY NAME _ DATE/TIME RECEIVED BY: NAME DATE/TIME . DATE/TIME _____ RECEIVED BY NAME _ RELINQUISHED BY NAME CATE/TIME_ AUTHORIZATION FOR DISPOSAL . DISPOSED BY: __

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NO. 370 69 190499 THE SAMPLING DATE SAMPLE TYPE B Q VOLUME NO OF COLLECTION TIME CONTRINERS COLLECTION TO BE CONFIDENCE COMPLETED TO BE CONFIDENCE OF THE CONFIDENCE COMPLETED TO BE CONFIDENCE OF THE CONFIDENCE COMPLETED TO SECOND THE CONFIDENCE CONFIDENCE COMPLETED TO SECOND THE CONFIDENCE	NO. 370 69 190 499 NO. 370 69 190 499 LE SAMPLING DATE SAMPLED MITTERSCRIP AIM OIL & GOLLECTION TO BE CONTAINERS COLLECTION E COMPLETED	A		1415	(3x Horse	5			2/17/2	_	B25	1173
NO. 370 69 190499 LE SAMPLING DATE SAMPLE TYPE & A VOLUME TO BE CONTAINERS CONTAINERS COMPLETED E COMPLETED E COMPLETED E COMPLETED E	NAME SAUPLING SAMPLED SAMPLE		4	1415	ł	ļ	2x1L					32	B25	35711
NO 370 69 190499 120 4	NO. 370 69 190499 SALE SAMPLER(S) SIGNATURE CAPITURE	COMMENTS	INITIAL	TIME COLLECTION COMPLETED	INITIAL	NO OF COLL	VOLUME TO BE COLLECTED	GRAB	۽ ۾	8 A	121	SAM	SAMPLING LOCATION	SAMPLE DENTIFICATION
	Saal Oil Site SAMPLERISI SIGNATURE CAPALLING LE		RIFFE	Jan &							199	704		L.

2 8

0460

Environmental Response Team, Environmental Protection Agency Woodbridge Ave., Edison, N.J. 08837 (201) 321-6860

Location: Sa	ad Sittle					
Collectors: Paul	ad Site Karmazi	nsky				
Lab Nu	mber (Consec.#'s)		collected		Time (24 hr)	
0	1258	OMO.	3 217 8	77	173	0
SOIL		LAND	`	EGETATION		GROUNDWATER
Device	Soil Type	Upland-Dry	Old Fie		"" I Water Table D	opth Ft.
Auger	Rock Gravel	Lowland-Dry Floodplain	Woode Farmia	-	e.	
Split Spoon	Sand	Wetland			Semple Death	Ft.
Cylinder Cup	Clay Silt	Gully	Herbac Shrubs	eous	_7	
Spade	Muck	Slope > 15	A 0			
Depth Ft.	Loam	< 15				
or in.	Peat Color:		DBH		In. Oil:	
	SURFACE WATER		#		RAME	LE PREPARATION
						EL FREFARITON
	T		C	Da44a 44	Container	Cleaning Procedure
Odor.	Temp	Device Kemmerer	Surface Clean	Bottom % Ooze	Container Glass Jar	Cleaning Procedure Low—High Concentration
Odor:	pH	Kemmerer Petersen	Clean Oil	Ooze Sand	Glass Jar Plastic Jar	Low—>High Concentration Detergent Wash
	· · · · · · · · · · · · · · · · · · ·	Kemmerer Petersen Surber	Clean Oil Garbage	Ooze Sand Gravel	Glass Jar Plastic Jar Metal	Low—High Concentration Detergent Wash Water Rinse
Odor:	PH Ft.	Kemmerer Petersen	Clean Oil	Ooze Sand	Glass Jar Plastic Jar	Low—>High Concentration Detergent Wash
Odor:	pH Ft.	Kemmerer Petersen Surber Manual Net Seine	Clean Oil Garbage Trash Bubbles Dead Fish	Ooze Sand Gravel Clay Rubble Rock	Glass Jar Plastic Jar Metal Acetate Core Paper Cap Teflon Cap	Low—High Concentration Detergent Wash Water Rinse Acetone Rinse Hexane Rinse Other Solvent Rinse
Odor: STREAM Width Depth	PH Ft.	Kemmerer Petersen Surber Manual Net Seine Trowl	Clean Oil Garbage Trash Bubbles Dead Fish Sewage	Ooze Sand Gravel Clay Rubble Rock Shell	Glass Jar Plastic Jar Metal Acetate Core Paper Cap	Low—High Concentration Detergent Wash Water Rinse Acetone Rinse Hexane Rinse
Odor:	PH Ft.	Kemmerer Petersen Surber Manual Net Seine	Clean Oil Garbage Trash Bubbles Dead Fish	Ooze Sand Gravel Clay Rubble Rock	Glass Jar Plastic Jar Metal Acetate Core Paper Cap Teflon Cap Foll Cap Storage	Low—High Concentration Detergent Wash Water Rinse Acetone Rinse Hexane Rinse Other Solvent Rinse
Odor: STREAM Width Depth Velocity FLOW DIRECTION	Ft. Ft. Ft. or In. Ft/Sec	Kemmerer Petersen Surber Manual Net Seine Trowl	Clean Oil Garbage Trash Bubbles Dead Fish Sewage Ind. Waste	Ooze Sand Gravel Clay Rubble Rock Shell	Glass Jar Plastic Jar Metal Acetate Core Paper Cap Teflon Cap Foll Cap	Low—High Concentration Detergent Wash Water Rinse Acetone Rinse Hexane Rinse Other Solvent Rinse
Odor: STREAM Width Depth Velocity	Ft. Ft. Ft. or In. Ft/Sec	Kemmerer Petersen Surber Manual Net Seine Trowl	Clean Oil Garbage Trash Bubbles Dead Fish Sewage Ind. Waste	Ooze Sand Gravel Clay Rubble Rock Shell	Glass Jar Plastic Jar Metal Acetate Core Paper Cap Teflon Cap Foll Cap Storage Wet Ice	Low—High Concentration Detergent Wash Water Rinse Acetone Rinse Hexane Rinse Other Solvent Rinse
Odor: STREAM Width Depth Velocity FLOW DIRECTION	Ft. Ft. Ft. or In. Ft/Sec Riffles%	Kemmerer Petersen Surber Manual Net Seine Trowl Bucket	Clean Oil Garbage Trash Bubbles Dead Fish Sewage Ind. Waste	Ooze Sand Gravel Clay Rubble Rock Shell	Glass Jar Plastic Jar Metal Acetate Core Paper Cap Teflon Cap Foll Cap Storage Wet Ice Ambient Dry Ice	Low—High Concentration Detergent Wash Water Rinse Acetone Rinse Hexane Rinse Other Solvent Rinse Specify:
Odor: STREAM Width Depth Velocity FLOW DIRECTION — Pools — %	Ft. Ft. Ft. or In. Ft/Sec Riffles%	Kemmerer Petersen Surber Manual Net Seine Trowl	Clean Oil Garbage Trash Bubbles Dead Fish Sewage Ind. Waste	Ooze Sand Gravel Clay Rubble Rock Shell	Glass Jar Plastic Jar Metal Acetate Core Paper Cap Teflon Cap Foll Cap Storage Wet Ice Ambient	Low—High Concentration Detergent Wash Water Rinse Acetone Rinse Hexane Rinse Other Solvent Rinse Specify:

Remarks and Site Description

TANK #15



Environmental Response Team, Environmental Protection Agency Woodbridge Ave., Edison, N.J. 08837 (201) 321-6660

Collecton: Cerrse Prince	Location: Se	ad Site					
SOIL Device Soil Type Upland-Dry Wooded Residential Water Table Depth Ft. Color: Spit Spoon Sand Wettand Cylinder Cup Spade Sift Octor: Depth Ft. Loam or Peat In. Color: Depth Ft. Loam or Peat Color: Odor: Depth Ft. Loam Or Peat In. Color: Device Surface Bottom Sand Garbage Garbage Garbage Garbage Garbage Garbage Garbage Ind. Water Rinse Depth Ft. Sec Garbage Rock Trash Retail Organic Fillor Cap Other Solvent Rinse Ft. Salme Ft. Clay Sewage Ind. Waster Float. Solids FLOW DIRECTION Ft/Sec Bucket Float. Solids Transe Trowl Sewage Ind. Waster Float. Solids FLOW DIRECTION Formation Distance Between Stations Distance Between Stations	Collectors: Ger	se Prince	,				
Device Soil Type Auger Rock Core Gravel Spitt Spoon Sand Cylinder Cup Sitt Muck Slope > 15° Depth Ft. Color: Color: Color: Depth Color: Device Surface Bottom % Container Cleaning Procedure Color: Device: Depth Color: Device:				Pays (77	Time (24	30
Auger Core Gravel Split Spoon Cylinder Cup Spade Split Spoon Color: Spade Split Spoon Color: Spade Split Spoon Color: Spade Split Spoon Split Spoon Color: Spade Split Spoon Split S	SOIL		LAND	\ \ \ \ \	EGETATION	l l	GROUNDWATER
Cylinder Cup Spade Slit Depth Loam Peat Color: DBH Color: Device: SAMPLE PREPARATION Colaring Procedure Clean Coles Glass Jar Color: Device: Sample Depth Color: Ddor: Device: SAMPLE PREPARATION Clean Coze Glass Jar Color: Device: D	Auger Core	Rock Gravel	Lowiand-Dry Floodplain	Woode	d Industri	al Water Table rcial	
SURFACE WATER Color: Temp Device Surface Bottom % Container Cleaning Procedure Odor: pH	Cylinder Cup Spade	Clay Silt	Gully	Shrube		_%	
Color:	Ft. or	Peat		DBH		in. Oil:	
Odor:pH		SURFACE WATER				SA	MPLE PREPARATION
Pools% Riffles% Dry Ice TRANSECT INFORMATION Compass Direction Distance Between Stations	Odor: SEAM Width Depth Velocity	PH Ft. Ft or in.	Kemmerer Petersen Surber Manual Net Seine Trowl Bucket	Clean Oil Garbage Trash Bubbles Dead Fish Sewage nd. Waste	Ooze Sand Gravel Clay Rubble Rock Shell	Glass Jar Plastic Jar Metal Acetate Core Paper Cap Teflon Cap Foil Cap Storage Wet Ice	Low—High Concentration Detergent Wash Water Rinse Acetone Rinse Hexane Rinse Other Solvent Rinse
Letter Station # Distance Between Stations	Pools%	Riffles%				Dry Ice	
			ass Direction			Distance Between	-

Remarks and Site Description

TANK#10



Environmental Response Team, Environmental Protection Agency Woodbridge Ave., Edison, N.J. 08837 (201) 321-6660

Location:Sa	rad Sit	e					
Collectors: Collectors	mge Prin	ce					
Lab Nu	mber (Consec.#'s)		Collected			Time (24 hr)	
0	1261	JMO.	3 \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	<u>*17</u>]		155	0
SOIL		LAND	٧	EGETATION		G	ROUNDWATER
Device	Soil Type	Upland-Dry	Old Fie			Water Table De	pth Ft.
Auger Core	Rock Gravel	Lowland-Dry Floodplain	y Woode Farmia				
Split Spoon	Sand	Wetland				Sample Depth	FL
Cylinder Cup	Clay	Gully		:eous	- <u>%</u>	Sample Sopal	
Spade	Silt Muck	Slope >15	Shrube 5° Trees	· ——	_%	Color	
Depth Ft.	Loem	< 1:					
or	Peat		DBH		In.	Oil:	
in.	Color:		ı			Device:	
			 <u>.</u>				
	SURFACE WATE	<u>I</u> R				SAMPI	LE PREPARATION
Color:	Temp	Device	Surface	Bottom %		ntainer	Cleaning Procedure
Color:		Device Kemmerer	Clean	Ooze	Gla	ntainer sas Jar	Cleaning Procedure Low—>High Concentration
	Temp	Device			Gla	ntainer sss Jar sstic Jar	Cleaning Procedure
Odor:	Temp pH Ft.	Device Kemmerer Petersen Surber Manual	Clean Oil Garbage Trash	Ooze Sand Gravel Clay	Gla Pla Me Acc	ntainer ass Jar astic Jar atal etate Core	Cleaning Procedure Low—High Concentration Detergent Wash Water Rinse Acetone Rinse
Odor:	Temp	Device Kemmerer Petersen Surber Manual Net	Clean Oil Garbage Trash Bubbles	Ooze Sand Gravel Clay Rubble	Gia Pia Me Acc Pa	ntainer ass Jar astic Jar atal etate Core per Cap	Cleaning Procedure Low—High Concentration Detergent Wash Water Rinse Acetone Rinse Hexane Rinse
Odor:	Temp Ft.	Device Kemmerer Petersen Surber Manual	Clean Oil Garbage Trash	Ooze Sand Gravel Clay	Gla Pla Me Acc Pai Tel	ntainer ass Jar astic Jar atal etate Core	Cleaning Procedure Low—High Concentration Detergent Wash Water Rinse Acetone Rinse
Odor:	Temp Ft.	Device Kemmerer Petersen Surber Manual Net Seine Trowl	Clean Oil Garbage Trash Bubbles Dead Fish Sewage Ind. Waste	Ooze Sand Gravel Clay Rubble Rock	Gla Pla Me Acc Pa _l Tet	ntainer ass Jar astic Jar atal etate Core per Cap flon Cap il Cap	Cleaning Procedure Low—>High Concentration Detergent Wash Water Rinse Acetone Rinse Hexane Rinse Other Solvent Rinse
Odor: SEAM Width Depth Velocity	Temp Ft.	Device Kemmerer Petersen Surber Manual Net Seine Trowl	Clean Oil Garbage Trash Bubbles Dead Fish Sewage	Ooze Sand Gravel Clay Rubble Rock Shell	Gla Pla Me Acc Paj Tel Foi	ntainer ass Jar astic Jar atal etate Core per Cap flon Cap	Cleaning Procedure Low—>High Concentration Detergent Wash Water Rinse Acetone Rinse Hexane Rinse Other Solvent Rinse
Odor: Since AM Width Depth Velocity FLOW DIRECTION —	Temp Ft. Ft or in.	Device Kemmerer Petersen Surber Manual Net Seine Trowl	Clean Oil Garbage Trash Bubbles Dead Fish Sewage Ind. Waste	Ooze Sand Gravel Clay Rubble Rock Shell	Gia Pia Me Acc Paj Tel Foi Sto We	ntainer ass Jar stic Jar stal etate Core per Cap flon Cap ii Cap prage	Cleaning Procedure Low—>High Concentration Detergent Wash Water Rinse Acetone Rinse Hexane Rinse Other Solvent Rinse
Odor: Depth Velocity FLOW DIRECTION Pools *** *** *** *** *** *** ***	Temp pH Ft. Ft. Ft. Ft. Ft. Ft. Ft. Ft	Device Kemmerer Petersen Surber Manual Net Seine Trowl	Clean Oil Garbage Trash Bubbles Dead Fish Sewage Ind. Waste	Ooze Sand Gravel Clay Rubble Rock Shell	Gia Pia Me Acc Paj Tel Foi Sto We	ntainer ass Jar stic Jar stal etate Core per Cap flon Cap il Cap orage	Cleaning Procedure Low—>High Concentration Detergent Wash Water Rinse Acetone Rinse Hexane Rinse Other Solvent Rinse
Odor: Since AM Width Depth Velocity FLOW DIRECTION —	Temp pH Ft. Ft. Ft. or In. Ft/Se Riffles %	Device Kemmerer Petersen Surber Manual Net Seine Trowl Bucket	Clean Oil Garbage Trash Bubbles Dead Fish Sewage Ind. Waste	Ooze Sand Gravel Clay Rubble Rock Shell	Gla Pla Me Acc Paj Tei Foi Sto	ntainer ass Jar astic Jar atal etate Core per Cap fion Cap at Cap arage at ice abient y ice	Cleaning Procedure Low—High Concentration Detergent Wash Water Rinse Acetone Rinse Hexane Rinse Other Solvent Rinse Specify:
Odor: Depth Velocity FLOW DIRECTION Pools *** *** *** *** *** *** ***	Temp pH Ft. Ft. Ft. or In. Ft/Se Riffles %	Device Kemmerer Petersen Surber Manual Net Seine Trowl	Clean Oil Garbage Trash Bubbles Dead Fish Sewage Ind. Waste	Ooze Sand Gravel Clay Rubble Rock Shell	Gla Pla Me Acc Paj Tei Foi Sto	ntainer ass Jar stic Jar stal etate Core per Cap flon Cap ii Cap prage	Cleaning Procedure Low—High Concentration Detergent Wash Water Rinse Acetone Rinse Hexane Rinse Other Solvent Rinse Specify:
Odor: SEAM Width Depth Velocity FLOW DIRECTION — Pools — % TRANSECT INFORMAT	Temp pH Ft. Ft. Ft. or In. Ft/Se Riffles %	Device Kemmerer Petersen Surber Manual Net Seine Trowl Bucket	Clean Oil Garbage Trash Bubbles Dead Fish Sewage Ind. Waste	Ooze Sand Gravel Clay Rubble Rock Shell	Gla Pla Me Acc Paj Tei Foi Sto	ntainer ass Jar astic Jar atal etate Core per Cap fion Cap at Cap arage at ice abient y ice	Cleaning Procedure Low—High Concentration Detergent Wash Water Rinse Acetone Rinse Hexane Rinse Other Solvent Rinse Specify:
Odor: SEAM Width Depth Velocity FLOW DIRECTION — Pools — % TRANSECT INFORMAT	Temp pH Ft. Ft. Ft. or In. Ft/Se Riffles %	Device Kemmerer Petersen Surber Manual Net Seine Trowl Bucket	Clean Oil Garbage Trash Bubbles Dead Fish Sewage Ind. Waste	Ooze Sand Gravel Clay Rubble Rock Shell	Gla Pla Me Acc Pay Tel Fol Sto We Am Dr)	ntainer ass Jar astic Jar atal etate Core per Cap fion Cap at Cap arage at ice abient y ice	Cleaning Procedure Low—High Concentration Detergent Wash Water Rinse Acetone Rinse Hexane Rinse Other Solvent Rinse Specify:

T17 gil/Nater Separator Pit - Eastern Tank



Location:	d Site							-
Collectors: GP 3	CB							<u>.</u>
Lab Nun	nber (Consec.#'s)	Date C	ollected			Time (24 hr)	_	
No 5	705	01.	3 213 8	¥7		0910		
SOIL	ı ı	LAND	V	EGETATION		GRO	UNDWATER	
Device	Soil Type	Upland-Dry	Old Fie			Water Table Depth		FL.
Auger Core	Rock Gravel	Lowland-Dry Floodplain	Woode Farmia	_				7
Split Spoon	Send	Wetland				Sample Depth		FL
Cylinder Cup Spade	Clay Silt	Gully	Herbed Shrube	:eous	-:		<u> </u>	ک
	Muck	Slope >15		•	_%	Color.		
Depth Ft.	Loam	< 19			7	Odor:		-
or in.	Peat Color:		Uon		_]"`	Device:		
	SURFACE WATER				,	SAMPLE I	PREPARATION	
Color		Device	Surface	Bottom %	Co	ntainer	Cleaning Proced	ure
Color:	oH	Kemmerer	Clean	Ooze		198_181	Low-High Co	
	T FL	Petersen	Oil	Sand	•	stic Jar	Detergent Wash Water Rinse	
STREAM Width		Surber Manual	Garbage Trash	Gravel Clay	Me Ac	state Core	Acetone Rinse	
Depth	Ft or	Net	Bubbles	Rubble		per Cap	Hexane Rinse	
	in.	Seine Trowi	Dead Fish Sewage	Rock Shell		ion Cap	Other Solvent Ri Specify:	nse
Velocity	Ft/Sec	Bucket	Ind. Waste	Organic	<u> </u>	ALBOO		
L			Float. Solids			it Ice		
FLOW DIRECTION	Riffles%					bient		
P0018	NIII 100	<u> </u>		<u> </u>	סט	/ Ice		
TRANSECT INFORMAT		ss Direction			Dis	tance Between Static	ons	
Letter Station #	5-5					1		Ft
B 10161					to			
Remarks and Site Descri	iption	7	101					
Rayahala #	r	_	10 mils					
Borehole #1	р	2 -	1 liter					
		-						
I hour off	er bailing 5	55 anl						
(11001 017	-, -, -, -, -, -, -, -, -, -, -, -, -, -	- J yui,						
nil present								

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FIELD DATA SHEET

Location:Saa	d Site			······································			
collectors: <u>GP</u>							و المساورة بي مساورة على المساورة و المساورة
Lab Nur	nber (Consec.#'s)	Date C	collected		T	ime (24 hr)	
No	5706	ONO.	3 213 8	¥7		0925	
SOIL		LAND	1	EGETATION		GR	DUNDWATER
Device	Soil Type	Upland-Dry	Old Fid	id Residen	ntial	ater Table Depth	FL
Auger	Rock	Lowland-Dry				ater rabie Deput	
Core Split Spoon	Gravel Sand	Floodplain Wetland	Farmia	nd Comme			
Cylinder Cup	Cley	Gully	Herbec	:eous	_* *	ample Depth	Ft.
Spede	Silt		Shrubi	·	- * _	-t	
Depth	Muck Losm	Slope > 15 < 15					
Ft. or	Peat		DBH		In. Oi	il:	
in.	Color:				→ ⋈	evice:	
	SURFACE WATER	<u> </u>				SAMPLE	PREPARATION
Color:	Temp	Device	Surface	Bottom %	Contai		Cleaning Procedure
Odor:	рН	Kemmerer	Clean	Ooze	Glass .		Low——High Concentration Detergent Wash
STHEAM Width	TTT FL	Petersen Surber	Oil Garbege	Sand Gravel	Metal	Jar	Water Rinse
		Manual	Trash	Clay		e Core	Acetone Rinse
Depth	Fi or	Net	Bubbles	Rubble	Paper		Hexane Rinse Other Solvent Rinse
·	in.	Seine Trowi	Deed Fish Sewage	Rock Shell	Foil Ca		Specify:
Velocity	FVSec		Ind. Weste	Organic			
		1	Float. Solids		Storage Wet lo		
FLOW DIRECTION		1			Ambie		
Pools%	Riffles%				Dry Ice	• 1	
TRANSECT INFORMAT		ess Direction			Distant	ce Between Stati	ione
Letter Station #	-	ESS DIFFECTION	_				
B 08	B-1.				to [is is	Ft
Remarks and Site Descri	iption						
Borehole	8		3 - 40				
1 hr afte	er bailing 55	s gal	2 - 1	L			
oil preser							



Location:	rad Oc	I Site	-					
Collectors:	Prince /	C. Buy	Lett					•
Lab Nur	nber (Consec.#'s)	Date C	ollected			Time (24 hr)		
No 5	707	d°.	3 213 8	17		1113	3	
SOIL		LAND	٧	EGETATION		GR	OUNDWATER	
Device	Soil Type	Upland-Dry	Old Fie	ld Residen	tial	Water Table Dept	TTT	FL
Auger	Rock	Lowland-Dry				Water labie Depu	"]""
Core Split Spoon	Gravel Sand	Floodplain Wetland	Farmia	nd Comme	rcial			_ ה
Cylinder Cup	Clay	Gully	Herbec	90US	- %	Sample Depth	1111	FL
Spade	Silt	C ,	Shrube		_%			_
Depth	Muck	Slope >15	Trees		_%			
Ft.	Loam	< 15			٦. ا			-
or	Peet		DBH	1 1 1	In.			-
in.	Color.					Device:		-
	SURFACE WATE	R				SAMPLE	PREPARATION	
Color:	Temp	Device	Surface	Bottom %	Col	ntainer	Cleaning Procedu	
Odor:	pH	Kemmerer	Clean	Ooze		se Jer	Low—High Cor	centration
		Petersen	Oli	Sand		stic Jar	Detergent Wash	
EAM Width	Ft.	Surber	Garbage	Gravel	Me	tal etate Core	Water Rinse Acetone Rinse	
	Ft Ft	Manual Net	Trash Bubbles	Clay Rubble	,	per Cap	Hexane Rinse	
Depth	or	Seine	Dead Fish	Rock		ion Cap	Other Solvent Rin	30
L		Trowl	Sewage	Shell	Foi	I Cap	Specify:	
Velocity	FVSe	c Bucket	Ind. Waste	Organic	940	rage		
<u></u>			Float. Solids			t ice		
FLOW DIRECTION		i i	I			bient		
Pools%	Riffles%	i i			Dŋ	/ Ice		
TRANSECT INFORMAT	ION							
Letter Station #	Comp	ess Direction			Dist	tance Between Stat	tions	
	•				to [Ft
B 10 14			_	لسلسا				j
Remarks and Site Descr	intion					·	······································	
	•	3-40 mil	<i>د</i>					
Borehole 4	_	•						
	2	2 - 1 Lite	(
1 hr after	مارنانهما		-					
i iv utter	Dalling							
منا محمد	<u></u>							
oil presen	T							
•								

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FIELD DATA SHEET

Location: Saad	Site	م و دول المال	······································			~~····		_
Collectors: G Prince	ce CBO	uchet	6					_
Lab Number (C		Date C	Collected	. 		Time (24 hr)		
Nº 570	18	ONO	3 213 8	17		11135		
SOIL		LAND	٧	EGETATION		GRO	UNDWATER	
Auger	oil Type Rock Bravel	Upland-Dry Lowland-Dry Floodolain	Old Fie Woode Farmla	d industri		Water Table Depth		FL
Split Spoon	Sand Clay	Wetland Gully	Herbac	eous	_%	Sample Depth		FL
	Silt Muck	Slope >1	Shrube 5° Trees		_%	Color:		
or i	Loam Peat	< 1]in.			_
	URFACE WATER		<u> </u>				PREPARATION	
Color: Temp		Device	Surface	Bottom %		oteinor iss Jar	Cleaning Procedu	
Odor: pH	Ft.	Kemmerer Petersen Surber	Clean Oil Garbage	Sand Gravel	PI3 Me	BIIC Jar	Detergent Wash Water Rinse Acetone Rinse	
Depth	Ft or in.	Manual Net Seine	Trach Bubbles Dead Fish	Clay Rubble Rock	Pay	per Cap Kon Cap	Hexane Rinse Other Solvent Rin	188
Velocity	Ft/Sec	Trowl Bucket	Sewage Ind. Waste Float, Solids	Shell Organic	Sto	i Cap rege	Specify:	
FLOW DIRECTION Riffle	•*		1		Ап	it ice abient / ice		
TRANSECT INFORMATION			l		Si-	Anna Dahwan Chal		
B 2 3 8-17	Compe	ss Direction	_ [to	tance Between Stati		Ft
Remarks and Site Description				•	2			
Developed by	driller		3-40	nuls liter				
oil present								



Environmental Response Team, Environmental Protection Agency Woodbridge Ave., Edison, N.J. 06837 (201) 321-6660

- -	rad Oil S						
Collectors:G_Z	rince CE	Burchet	to		 		
	nber (Consec.#'s) 3709	Date C	3 213	817		Time (24 hr)	0
SOIL		LAND		VEGETATION		G	ROUNDWATER
Device Auger Core Split Spoon Cylinder Cup Spade Depth Ft. or In.	Soil Type Rock Gravel Sand Clay Silt Muck Loam Peat Color:	Upland-Dry Lowland-Dry Floodplain Wetland Gully Slope > 19	Wood Farn Her Shr 5° Tree	*	ial	Water Table Depth Sample Depth Color: Odor: Oil: Device:	FL
	SURFACE WATER	1				SAMPL	e preparation
Color:	Temp	Device Kemmerer Petersen Surber Manual Net Seine Trowl Bucket	Surface Clean Oil Garbage Trash Bubbles Dead Fish Sewage Ind. Waste	Shell Organic	PRI AC PRI SHE	ess jar essic jar estic jar estate Core es	Cleaning Procedure Low—High Concentration Detergent Wash Water Rinse Acetone Rinse Hexane Rinse Other Solvent Rinse Specify:
Letter Station #		ass Direction			Dis	stance Between St	ations is Ft
Remarks and Site Descri	moutes	0	3-1	40 mile)		

Bailed 30 minutes previous 2-1 lites oil present Chemical odos



Environmental Response Team, Environmental Protection Agency Woodbridge Ave., Edison, N.J. 08837 (201) 321-6660

Location: Sa	ad oil S						·	
Collectors: G. A	rince, C.	Burchet	to					
Lab Nu	mber (Consec.#'s)	Date Colk				Time (24 hr)	·	
No	5710	Oi3	213 8	<u>"</u> 2		135	δ	
SOIL		LAND	V	EGETATION		GI	ROUNDWATER	
Device	Soil Type	Upland-Dry	Old Fie			Water Table Dec		 Ft.
Auger	Rock Gravel	Lowland-Dry Floodplain	Woode				اللللا	_
Split Spoon	Send	Wetland			•	Sample Depth		FŁ
Cylinder Cup Spede	Clay	Gully	Herbac Shruba		%			
Depth	Muck	Slope >15°	Trees		_%	Color:		
Ft. or	Loam Pest	< 15°	DBH		In.			
in.	Color:					Device:		
	SURFACE WATER	1				SAMPL	E PREPARATION	
Color:	Temp		Surface	Bottom %		nteiner	Cleaning Procedure	
Odor:	pH	Kemmerer Petersen	Cieen Oil	Ooze Sand		ess Jar estic Jar	Low—sHigh Conce Detergent Wash	ntration
STREAM WIGH	Ft.	Surber	Garbage	Gravel	****	rtal .	Water Rinse	
<u></u>	Ft Ft	Manual Net	Trach Bubbles	Clay Rubble		etate Core per Cap	Acetone Rinse Hexane Rinse	
Depth	or	Seine D	Deed Fish	Rock	Ko	flon Cap	Other Solvent Rinse	t
Velocity		1	Sewage nd. Waste	Shell Organic	\$	il Cap	Specify:	
Velocity	FVSec	,	oet. Solids	O ga	_	rt ice		
FLOW DIRECTION					H (nbient		
Pools%	Riffles%	<u> </u>			Dr	y Ice		
TRANSECT INFORMAT		ass Direction			Dia	stance Between St	ations	
Letter Station #			_					Ft
B 10 / 1	<i></i>		L		to			rl
Remarks and Site Descr	ription					,		
Durand	5 minutes	+:1	d		٠	3-40m	So	
pulyed 1	- muuu	unu	any		٠			

2-1 liter



Environmental Response Team, Environmental Protection Agency Woodbridge Ave., Edison, N.J. 08837 (201) 321-6660

Location: Saa	d Ou Set						
Collectors: <u>C. D.</u>	ince CB	urchet	6				
Lab Nurr	nber (Consec.#s)		collected			Time (24 hr)	
Nº 5	711	Mo OL	3 213	87		140	0
\$OIL		LAND		VEGETATION		G	ROUNDWATER
Auger Core Split Spoon	Soil Type Rock Gravel Sand	Upland-Dry Lowland-Dry Floodplain Wetland	Farmi	ed Industri and Comme	ial	Water Table Dep Sample Depth	oth Ft.
Cylinder Cup Spade	Clay Silt	Gully	Herbe Shrut	ceous	_~		<u></u>
Depth Ft. or in.	Muck Loem Peet Color:	Slope > 15 < 15			_% %	Odor:	
	SURFACE WATER					SAMPL	E PREPARATION
	-	Device Kemmerer Petersen Surber Manual Net Seine Trowl Bucket	Surface Clean Oil Garbage Trash Bubbles Dead Fish Sewage Ind. Waste Float. Solids	Bottom % Ooze Sand Gravel Clay Rubble Rock Shell Organic	Gle Place Merical Acceptant Foi Sto	ntainer usis Jar usis	Cleaning Procedure Low—High Concentration Detergent Wash Water Rinse Acetone Rinse Hexane Rinse Other Solvent Rinse Specify:
TRANSECT INFORMATI		ss Direction			Dist	tance Between St	ations
B 25	۹		[to [is Ft
purged presence	ption for 30 min of oil	utes		3-4	_	milo ter	

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Location:	sad Os						
Collectors:	Prince	/ C. Bur	chett	<u></u>			
Lab Nur	nber (Consec.#'s)	Date Colle				Time (24 hr)	
No	5719	013	208	17			
SOIL		LAND	,	/EGETATION		G	ROUNDWATER
Device	Soil Type	Upland-Dry	Old Fix	eld Resider	rtiel	Water Table Dec	[] [] []
Auger	Rock	Lowland-Dry	,Woode			Mater (able Det	oth Ft.
Core	Gravel	Floodplain Wetland	Farmia	and Comme	rcial	ł	
Split Spoon Cylinder Cup	Sand Clay	Gully	Herber	ceous	_ %	Sample Depth	FL FL
Spede	Silt	Cony	Shrube		_		
Depth	Muck	Slope > 15°	Trees		%	Color:	
Ft.	Loam	< 15°	1		٦.		
or	Peat		DBH		In.		
	Color:					000100	
	SURFACE WATE	ER				SAMPL	E PREPARATION
Color:	Temp	Device	Surface	Bottom %	C	ontainer	Cleaning Procedure
Odor.	pH	Kemmerer	Clean	Ooze		ess Jar	Low-High Concentration
	FL	Petersen	OH	Sand	,	estic Jar etai	Detergent Wash Water Rinse
SEAM Width		Surber (Barbage Trash	Gravel Clay	,,,,	etate Core	Acetone Rinse
	7 7 7 Ft	[Bubbles	Rubble		per Cap	Hexane Rinse
Depth	or	Seine D	eed Fish	Rock		fion Cap	Other Solvent Rinse
Ţ.		1	Sewage	ewage Shell I. Waste Organic It. Solids		il Cap	Specify:
Velocity	FVSe	C /				orage	
FLOW DIRECTION			el, sollos		•	et ice	
	Riffles%	1		1		nbient	
	······································					y ice	
TRANSECT INFORMAT					O.	stance Between St	etione
Letter Station #	Com	pass Direction			U	CONTRACTOR SE	EUVID
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Remarks and Site Descr	iption						
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Location:	ead-Oil									_
Collectors:	Prince /	C. Burc	het	tte	· · · · · · · · · · · · · · · · · · ·					•
Lab Nurr	iber (Consec.#'s)	Date C	offected	d			Time (24 Nr).			
No 5	720	O):	3 2	8	17					
SOIL		LAND		VI	EGETATIO	N	G	ROUNDWAT	ER	
Device	Soil Type	Upland-Dry		Old Fiel	d Resid	ential	Water Table Des		7 7	٦.,
Auger	Rock	Lowland-Dry	, I	Wooded			Water Table Dep			FL.
Core Split Spoon	Gravel Sand	Floodplain Wetland	Ĺ	Fermian	nd Come	nercial	i		T	ה
Cylinder Cup	Cley	Gully		Herbace	90US	%	Sample Depth		1 1	FL
Spade	Silt		ı	Shrubs		%	Ē			-
Depth	Muck	Slope >15		Trees		×	Color:			•
Ft.	Loam	< 19	2	DBH		Min.	Odor:			•
or in.	Pest Color:		Ì	OG.		L_]""	Device:			-
	SURFACE WATE	ER .	L_			1	SAMPL	E PREPARA	TION	
Color:	Temp	Device	Surf	face	Bottom 9	Co	ontainer	Cleaning	Procedu	re
	рН	Kemmerer	Cle		Ooze		ass Jar		-	centration
	FL	Petersen	0	- · · · · · · · · · · · · · · · · · · ·	Sand		astic Jar	Deterger Water Ri		
SmiEAM Width		Surber	Gart	, ,	Gravel Clay		etal cetate Core	Acetone		
	Ft.	Net			Rubble		per Cap	Hexane Rinse		
Depth	or	Seine	Dead	Fish	Rock	Te	fion Cap	Other So	olvent Rin	200
		Trowl	Sew		Shell	Fo	H Cap	Specify:		
Velocity	FVS4	Bucket	Ind. V		Organic	St	orage			
FLOW DIRECTION			Float. Solid	30105			et Ice			
Poois%	Riffles%	1		}		1	nbient ry Ice			
TRANSECT INFORMATI	ON						y ice	<u> </u>		
Letter Station #		pass Direction				Dia	stance Between St	etions		
Letter Station v	•				TT	7 to		is T	TT	Ft
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Remarks and Site Descri	ption				<u> </u>					
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PROJECT	Saad Waste Oil	2	ઇ	0472
PROJECT NO	37069190499	BORING	B-1	
ELEVATION	581.7	DATE	3/19/87	
FIELD GEOLOG	IST Karma	azinski		

	,mple No.,	Blows/ Six	Material Moisture	Soil Density/ Consistency		
	Type, and Depth (FT.)	Inches or RQD (%)	and Water Depth (FT.)	or Rock Hardness	LITHOLOGY	DESCRIPTION
ე.0	S-1 0.0'-	26/50/1"	l'	V.Dense	4/6	0.0'-2.5' Dark Gray Gravel Fill, Some Reddish Brown Sand and Clay
	7" S-2	/9	Dry			
	1.5'- 3.0'	12/17		M.Dense	P-17 B 2 - 1 - 6	2.5'-3.0' Oil Impregnated Gravel, Sand & Clay
	S-3 3.0'-	10/12				with Wood Particles (Organic Odor) 3.0'-5.0' Oil Impregnated Dark Gray-Black
	4.5' S-4	36/10	Moist	Dense		Gravel, Clay, Sand
9 0.	4.5'- 6.0'	10/30	1010131	Hard		5.0'-6.0' Brown Clay & Gravel; Trace Silt & Sand
	S-5 6.0'-	20/45		Hard		6.0'-6.5' Oil Impregnated Clay & Gravel; Trace Silt & Sand
	7.5′ S-6	19/10			7777	6.5'-7.5' Brown Clay & Gravel, Trace Silt & Sand 7.5'-8.0' Gravel
	7.5'- 9.0'	6/7		Stiff		8.0'-9.0' Lt. Brown Silty Clay & Coarse Sand Slightly Impregnated @ 8.9'
	R-1 9.0'-		Wet			9.0'-13.0' No Recovery
0 0.	13.0′					
	<u> </u>					
	R-2 13.0'-		<u> </u>			
	13.5'				<i>y</i> , <i>y</i> , <i>y</i> , <i>y</i> ,	13.0'-13.5' Gray to Blue-Green Clay; Trace Gravel
5 0'						BOB 13.5'
						Rock 13.5'
			1			
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REMARKS	Drilling Method - Auger	BORING	B-1
	Casing - Temporary		
		PAGE 1	OF _1_

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PROJECT	Saad Waste (liC		
PROJECT NO	37069190499	BORING	B-2	
ELEVATION	580.3	DATE	3/19/87	
FIELD GEOLOG	IST Kar	mazinski		

	ample No., Type, and Depth (FT.)	Blows/ Six Inches or RQD (%)	Material Moisture and Water Depth (FT.)	Soil Density/ Consistency or Rock Hardness	LITHOLOGY	DESCRIPTION
0.0	S-1 0.0'-	23/25		Dense		0.0'-1.0' Dark Gray Gravel Fill
	1.5' \$-2	7/5				1.0'-2.5' Dk.Gray Gravel Fill & Brown Sandy Clay, Mottled
	1.5′- 3.0′	4/9	Moist	Stiff		2.5'-3.0' Gray Silty Clay - Slight Odor
	S-3 3.0'-	8/6		Stiff	28558	3.0'-5.0' Greenish Brown Clayey Silt with Rotted Wood Debris
5 0'	4.5' S-4	8/3				
	4.5′- 6.0'	3/5		M.Stiff	2.2.4.4	5.0'-15.2' Dk.Gray Clayey Silt - Some Sand, Slight Oily texture, Distinct Odor 6.0'to BOB,
	S-5 6.0'-	2/2		M.Stiff	(/_//_/_	7.4'-7.5' Clay Lense 7.5'-15.2' Increased Sand Concentra-
	7.5' S-6	4/1			1.1111	tion Downward with Sand Lenses
	7.5'- 9.0' R-1	1/1	1	V.Soft	LLLLL	
10 0'	9.0'- 14.0'		}		11111	
			Wet		2-1-1-1	
,	F		vvet		1/2//	
	R-2					
150'	14.0'- 17.5'-		∇			15.2'-17.2' Lt. Gray Silty Clay with Some Well
			<u> </u>			Graded Sand
			1		BR	17.2'-17.5' Lt. Gray Weathered Sandstone
			· ·			BOB - Auger Refusal 17.5'
	<u></u>		-		•	
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REMARKS _	Drilling Method - Auger	BORING	B-2
	Casing - Temporary		
		PAGE 1	OF _1_

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 PROJECT
 Saad Waste Oil

 PROJECT NO.
 37069190499
 BORING
 B-3

 ELEVATION
 581.3
 DATE
 3/19/87

 FIELD GEOLOGIST
 Karmazinski

	sample No., Type, and Depth (FT.)	Blows/ Six Inches or RQD (%)	Material Moisture and Water Depth (FT.)	Soil Density/ Consistency or Rock Hardness	LITHOLOGY	DESCRIPTION
0 0	S-1 0.0'-	9/15	Dry	M.Dense		0.0'-1.5' Dark Gray Gravel, Some Reddish Brown Sand & Clay Fill, 1.4'-1.5' Oil
	1.5′ S-2	14/9		-		Impregnated 1.5'-3.0' Gray Gravel & Brown Sand , Slight Oil
	1.5'- 3.0'	22/39		V.Dense		Stain, (Slight Odor)
	S-3 3.0'-	12/49	Moist	V.Dense		3.0'-4.5' Dk. Gray Gravel and Brown Sand
	4.5' S-4	7/3		V.Dense	نو نمر وز نمر نر	4.5'-5'4" Dk.Gray Gravel and Reddish Brown
5 0'	4.5'- 5'7" ·	46/50/1"				Sandy Clay
	37					Auger Refusal 5'4" (Not on Rock)
0 0'						
`	T					
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REMARKS	Drilling Method - Auger	BORING_	B-3	
	Casing - None Installed			
		PAGE _1	OF _1_	_

PROJECT Saad Waste Oil PROJECT NO. <u>37069190499</u> BORING B-4 2 8 0475

ELEVATION 580.1 DATE ____3/18/87

FIELD GEOLOGIST Karmazinski

	sample No., Type, and Depth (FT.)	Blows/ Six Inches or RQD (%)	Material Moisture and Water Depth (FT.)	Soil Density/ Consistency or Rock Hardness	LITHOLÓGY	DESCRIPTION
0 0	S-1 0.0'-	7/7	Dry	Stiff	7. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2.	0.0'-1.0' Dark Gray Gravel & Brown Sand Fill
	1.5' S-2	7/2		-		1.0'-1.5' Reddish Brown Sandy Clay 1.5'-9'1" Reddish Brown Sandy Clay and Gravel
	1.5′- 3.0′	6/14		V.Stiff		4.0'-6.0' Oil Impregnated Zone
	S-3 3.0'-	6/7	Moist			
5 Oʻ	5.0'	5/5		Stiff		
30	R-1		7			
	5.0'- 7'4"					
	S-4	/45	Wet			
	7'4"- 9'4"	48/25		V.Dense		Auger Refusal 9'1"
		14/			1 20 92 9102 .2	BOB 9'1"
10 0'						Rock 9'1"
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REMARKS	Drilling Method - Auger	BORING_	B-4
_	Casing - Temporary		
-		PAGE _1	OF _1_

BORING	B-5
DATE	3/20/87

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PROJECT Saad Waste Oil PROJECT NO. 37069190499

ELEVATION 581.5 DA

FIELD GEOLOGIST Karmazinski

	imple No., Type, and Depth (FT.)	Blows/ Six Inches or RQD (%)	Material Moisture and Water Depth (FT.)	Soil Density/ Consistency or Rock Hardness	LITHOLOGY		DESCRIPTION
0.	S-1 0.0'-	50/5"/		V.Dense		0.0'-4.0'	Dark Gray Gravel
	5" S-2	/50/4"					
	1.5'- 1'10"		Dry	V.Dense			
	S-3 3.0'-	40/34		V.Dense			
0'	4.5' S-4	25/15			2 2 2	4.0'-6.0'	Dark Gray Gravel, Brown Clayey Silt and Sand
	4.5'- 6.0'	16/12		M.Dense	1. 2. 2. 4. V		
	S-5 6.0'-	4/3	Moist			6.0'-7.5'	Brown Sandy Clay - Odor Present
	7.5' S-6	5/2		Stiff		7.5′-10.5′	Oil Impregnated Sandy Clay and
	7.5'- 9.0'	4/7		Stiff			Gravel Grading to Oil Laden Gravel, Clay and Sand @ 8.0'
0'	S-7 9.0'- 10.5'	6/5	Wet				
	10.5	15/		V.Stiff	24. 4 4	10.5′-14.5′	' No Recovery
٠,	<u> </u>						
	10.5′-						
	14.5						
0,	R-2				2, 2, 2, 2, 2, 2, 2		' Oil Laden Gravel ' Brown Clayey Silt, Some Sand and
	14.5'-				ر فر فره فر فرند	10.0	Gravel
	19.5'				المدارك المداكر الإ		
	19.5					17.5′-19.0	' Brown Sandy Silt and Gravel
	<u> </u>				<i>2 4 4 2 2</i>	19.0′-19.5	Brown Clayey Silt and Sand
0.			1				Auger Refusal 19.5
							BOB 19.5'
						li	
			}				
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BORING B-5 NEMARKS Drilling Method - Auger Casing - Temporary PAGE _ 1 OF _ 1

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PROJECT	Saad Waste C	<u>)il</u>		
PROJECT NO	37069190499	BORING	B-7	
ELEVATION	582.1	DATE	3/21/87	
FIELD GEOLOG	IST Karr	mazinski		

	Sample No., Type, and Depth (FT.)	Blows/ Six Inches or RQD (%)	Material Moisture and Water Depth (FT.)	Soil Density/ Consistency or Rock Hardness	LITHOLOGY	DESCRIPTION
·.0·	S-1 0.0'-	32/16	Dry	M.Dense		0.0'-1.0' Dark Gray Gravel Fill
	1.5' S-2	8/6			42442	1.0'-1.5' Reddish Brown Clayey Silt 1.5'-3.0' Reddish Brown Clayey Silt, Trace Sand
	1.5′- 3.0′	9/19	Moist	M.Dense	A St. St. St.	and Gravel
						Auger Refusal 3.0' Air Rotary Drilling to 10.0' No Return
0'						
			∇	ļ		
0 0.						Rock 10.0' BOB 10.0'
			-			
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REMARKS	Drilling Methods - Auger to 3.0, Air Rotary to 10.0'	BORING_	B-7	
	Casing - None Installed			
		PAGE 1	OF _1	_

PROJECT	Saad Waste Oil			
PROJECT NO	37069190499	BORING	B-8	_
ELEVATION		DATE	3/21/87	- 2
FIELD GEOLOG	IST Karm	azinski		_ _ ∞

ample No., Type, and Depth (FT.)	Blows/ Six Inches or RQD (%)	Material Moisture and Water Depth (FT.)	Soil Density/ Consistency or Rock Hardness	LITHOLOGY	DESCRIPTION
S-1 0.0'-	23/28	Dry	Dense		0.0'-1.0' Dark Gray Gravel and Brown Sand, Some Oil Stain
1.5' S-2	21/38	-	-		1.0'-1.5' Reddish Brown Clayey Silt, Trace Sand, Mottled
1.5'- 2'10"	20/50/4*		Hard		1.5'-4.5' Reddish Brown Clayey Silt and Gravel; Trace Sand, Mottled
S-3 3.0'-	34/8	Moist	V.Stiff	1 1 2 1	3.0'-4.5' Oil Impregnated
4.5'	20/			**************************************	Auger Refusal BOB 4.5'
					(Not on Rock)
				-	
' 					
		-			
1				}	

REMARKS	Drilling Method - Auger	BORING_	B-8
	Casing - None Installed		
		PAGE _ 1	_OF _1_

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PROJECT	Saad Wa	aste Oi	l		
PROJECT NO.	3706919	0499	BORING	B-9	
ELEVATION	581.5		DATE	3/21/87	
FIELD GEOLOG	IST	Karm	azinski		

Sample No., Type, and Depth (FT.)	Blows/ Six Inches or RQD (%)	Material Moisture and Water Depth (FT.)	Soil Density/ Consistency or Rock Hardness	LITHOLOGY	DESCRIPTION
S-1 0.0'-	15/18		Dense		0.0'-0.5' Dark Gray Gravel Fill 0.5'-5.25' Dark Gray Gravel and Sand Fill with
1.5' S-2	19/8				Oil Stain
1.5'- 3.0'	30/12	Moist	Dense		
S-3 3.0'-	30/14		M. Dense		3.0'-5.25' Red Paint or Dye on Split Barrel, Mixed with Oil
4.5' S-4	16/7				
4.5′- 5.25′	50/3*/				Auger Refusal and BOB 5.25'
		Wet			
				_	
				_	
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Drilling Method - Auger	BORING	B-9
Casing - None Installed		
	PAGE 1	OF _ 1
		Casing - None Installed

 PROJECT
 Saad Waste Oil

 PROJECT NO.
 37069190499
 BORING
 B-10

 ELEVATION
 582.0
 DATE
 3/21/87

 FIELD GEOLOGIST
 Karmazinski

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ample No., Type, and Depth (FT.)	Blows/ Six Inches or RQD (%)	Material Moisture and Water Depth (FT.)	Soil Density/ Consistency or Rock Hardness	LITHOLOGY	DESCRIPTION
S-1 0.0'-	8/4		M.Dense		0.0'-6'4" Dark Gray Gravel and Silty Clay, Trace Sand
1.5′ S-2	8/48				0.0-1.5' - Dry Oil 1.5'-6'4"-Oil Concentration Increased
1.5′- 3.0′	16/30		Dense		with Depth
S-3 3.0'-	15/6		Loose		
4.5' S-4	4'/1/1'				4.5'-6.0' Green Paint or Dye, Wood and Debris
4.5'- 6.0'	1/1 '/8		Loose		
S-5 6.0'-	50/4"/				BOB and Auger Refusal 6'4"
6'4"		ĺ			Not on Rock
0'					
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REMARKS	Drilling Method - Auger	BORING_	B-10
	Casing - None Installed		
_		PAGE _1_	OF 1

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PROJECT	Saad Wa	iste Oil		
PROJECT NO	3706919	0499	BORING	B-11
ELEVATION	582,2		DATE	3/22/87
FIELD GEOLOG	IST	Karm	azinski	

Sample No., Type, and Depth (FT.)	Blows/ Six Inches or RQD (%)	Material Moisture and Water Depth (FT.)	Soil Density/ Consistency or Rock Hardness	LITHOLOGY	DESCRIPTION
S-1 0.0'- 1.5'	16/29 10/50/5"		Dense	4 2 1 1 1 A 2 1 1 2 2	0.0'-4.5' Dark Gray Gravel Fill and Clayey Silt Some Sand, Dry Oil Impregnated
S-2 1.5'-	1073073	1	V.Dense		
1′11" S-3	39/6	Moist	M.Dense	2244	
3.0'- 4.5'	8/5	1		7. 7. / . /	4.5'-7.5' No Recovery
\$-4 4.5'- 6.0'	3/5	1	Loose		4.5'-7.5' No Recovery
S-5 6.0'-	2/50/0*	∇			
6.5' S-6			V.Dense		7.5'-8.7' Oil Laden Clayey Silt
7.5'- 9.0' R-1				_	8.7'-9.0' Oil Laden Sand 9.0'-12.5' Oil Laden Clayey Silt and Gravel,
9.0'- 14.0'		-			Some Sand Bottom of Oil Laden Zone 12.5'
1				1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	
		Wet		7.222	12.5'-17'8" Brown Clayey Silt with Sand Lenses, Some Oil Stain
R-2					
17.8']			
		-			
					Rock 17'8" BOB 17'8"
		_		-	
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REMARKS	Drilling Method - Auger	BORING_	B-11
	Casing - Well Installed		
_		PAGE 1	OF 1

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 PROJECT
 Saad Waste Oil

 PROJECT NO.
 37069190499
 BORING
 B-12

 ELEVATION
 581.8
 DATE
 3/21/87

 FIELD GEOLOGIST
 Karmazinski

No., Type, and Depth (FT.)	Blows/ Six Inches or RQD (%)	Material Moisture and Water Depth (FT.)	Soil Density/ Consistency or Rock Hardness	LITHOLOGY	DESCRIPTION
S-1 0.0'-	16/22	Dry	Dense		0.0'-1.5' Dark Gray Gravel Fill and Brown Sandy Silt
1.5' S-2	15/41			7 9 9 9 9 9	1.3'-5.0' Dry Oil Stain 1.5'-5.0' Dark Gray Gravel and Clayey Silt,
1.5'- 3.0'	10/7	Moist	M.Dense	L. L. L. L. E. C. L. L. L. L.	Some Sand
S-3 3.0'-	10/50/3**		V.Dense		
3.75' S-4	/50/5*		V.Dense	La. 2. 2. 4. 4	
4.5 - <u>4'11"</u>					5.0'-9.0' Gravel, Sand and Silt; Heavily Oil Laden, Minimal Recovery
S- 5 6.0′-	9/18	∇	M.Dense		
7.5′ S-6	2/10	Wet		01 01 01 01 01 01 01 01 01 01 01 01 01 0	
7.5"- 9.0′	29/17		Dense		
					9.0'-10'5" Boulders
S-7 10.0'-	50/5"/	·	V.Dense		BOB and Auger Refusal 10.5'
10'5"					Not on Rock
		7			
		7			
		1			
<u> </u>		7		1	
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<u> </u>		-	-	1	
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		-		4	
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REMARKS	Drilling Method - Auger	BORING_	B-12
	Casing - None Installed		
		PAGE 1	OF _1_

PROJECT Saad Waste Oil PROJECT NO. 37069190499 BORING B-13 ELEVATION___ ______DATE _____3/24/87 FIELD GEOLOGIST____ Karmazinski

iample No., Type, and Depth (FT.)	Blows/ Six Inches or RQD (%)	Material Moisture and Water Depth (FT.)	Soil Density/ Consistency or Rock Hardness	LITHOLOGY	DESCRIPTION
S-1 0.0'- 1.5'	7/27	Dry	V.Dense	0.	0.0'-4.0' Dark Gray Gravel, Sand and Silt Fill, Oil Laden
1.5′ S-2	28/17			فعنده ويشوه وسند	
1.5'- 3.0'	21/33	Wet	V.Dense		
S-3 3.0'-	11/12		V.Dense		
4.25' S-4	50/3*/6				4.0'-4.5' Reddish Brown Clayey Silt and Gravel Trace Oil
4.5'- 6.0'	8/5		Stiff	6422	4.5'-11.5' Oil Impregnated Gray Clayey Silt and Gravel with Sand Lenses
S-5 6.0'-	4/5		Stiff	-44-	Increased Clayey Silt Content Downward
7.5' S-6	6/2				8.9'-9.0' Free Product Zone
7.5'- 9.0'	1/1		Soft		
S-7 9.0'-	1/50/4"		Hard		
10.5'	1/50/5*		Hard		
10.5'-					11.5' Auger Refusal Air Rotary Drilling 11.5'-20'1" No Return
		1			- 1
		1		 	Rock 20'1" BOB 20'1"
		1		1 1	
		1		1	
		1		1	
	 	1		4	

REMARKS	Drilling Methods - Auger to 11.5', Air Rotary to 20'1"	BORING_	B-13
	Casing - None Installed	_	
		PAGE 1	OF _1_

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PROJECT Saad Waste Oil

PROJECT NO. 37069190499 BORING B-14

ELEVATION 581.4 DATE 3/18/87

FI	EL	D (GE	0	LC)GI	IST	•	
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,	Jample No., Type, and Depth (FT.)	Blows/ Six Inches or RQD (%)	Material Moisture and Water Depth (FT.)	Soil Density/ Consistency or Rock Hardness	LITHOLOGY	DESCRIPTION
0 0 [,]	S-1 0.0'-	5/15	Damp	M.Dense		0.0'-1.5' Dark Gray Gravel
	1.5' S-2	9/10			17/1/	1.5'-4'1" Dark Gray Gravel, Some Sand and
ļ	1.5'- 3.0'	7/3	₩et	M.Dense	11111	Clay (Brown) Distinct Odor, No Product
	S-3 3.0'-	8/28		V. Dense	1111	
5.0'	4′1″	50/1"/				Auger Refusal 4'5" Not on Rock
						Air Rotary Drilling to 20.0'
						·
1 0 0 ′						
100						
×	[
150'		ļ				
			1			
		-	1			
			1			
50 0,		 	-			Rock 20.0' BOB 20.0'
		 				555 20.0
			-		-	
	<u></u>		4			
			4			
	ļ					

REMARKS	Drilling Methods - Auger to 4'5", Air Rotary to 20.0'	BORING	B-14
	Casing - Well Installed		
-		PAGE 1	OF _ 1

PROJECT	Saad Waste	Oil	
PROJECT NO	3706919049	BORING	B-15
ELEVATION	581.8	DATE	3/18/87
FIELD GEOLOG	ISTKai	rmazinski	

,	Sample No., Type, and Depth (FT.)	Blows/ Six Inches or RQD (%)	Material Moisture and Water Depth (FT.)	Soil Density/ Consistency or Rock Hardness	LITHOLOGY	28 0485 DESCRIPTION
0.0	S-1 0.0'-	7/12	D	V.Dense		0.0'-1.0' Dark Gray Gravel
	1'11" S-2	50/5"	Dry	V.Dense		1.0'-2.25' Dark Gray Gravel and Reddish Brown Sand and Clay
	1.5′- 1.75′				17.7.9.9.9	BOB 2.25'
	<u>-</u>					Rock 2.25'
5.0'						
			i			
	<u> </u>					

REMARKS	Drilling Method - Auger	BORING	B-15
	Casing - None Installed		
		PAGE 1	_OF _1_

				PROJECT				
				PROJECT NO				
				ELEVATION FIELD GEOLOG				
				HELD GLOCOG		Karinaziriski		
sample No., Type, and Depth (FT.)	Blows/ Six Inches or RQD (%)	Material Moisture and Water Depth (FT.)	Soil Density/ Consistency or Rock Hardness	LITHOLOGY		DESCRIPT	ION	
5-1 0.0′-	12/14		V.Dense		0.0'-3.5' D	ark Gray Gravel		
1.25'	50/3"/	Dry						
1.5'-	50/4*		V.Dense					
1'10" 5-3	/50/0"					BOB 3.5	; <u> </u>	
3.5′	. 30.0					Rock 3.5		
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				<u>}</u>				
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	/s ==	-::::			<u></u>	BOR	ING B-16	
EMARK			od - Auger			BUK		
		asing - None	einstalled				E 1 OF 1	

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PROJECT	Saad Wa	aste Oil			
PROJECT NO	3706919	0499	BORING	B-17	
ELEVATION	578.7		DATE	3/19/87	
FIELD GEOLOG	Karm	azinski			

0 0	Sample No., Type, and Depth (FT.)	Blows/ Six Inches or RQD (%)	Material Moisture and Water Depth (FT.)	Soil Density/ Consistency or Rock Hardness	LITHOLOGY	DESCRIPTION
00	S-1 0.0'- 1.5'	2/4		Stiff		0.0'-3.0' Reddish Brown Clayey Silt; Some Sand and Gravel Fill
	S-2 1.5'-	6/4 6/11	Moist	V.Stiff		
5.0'	3.0'		▽		100 A (100 A 100 A 1	Auger Refusal @ 3.0' 3.0'-14.25' Air Rotary Drilling No Return
10.0						
			1			0.5' Void @ 13.25' Rock @ 13.75'
15 0						BOB 14.25'
			 			

REMARKS	Drilling Methods - Auger to 3.0', Air Rotary to 14.25'	BORING_	B-17
	Casing - None Installed		
		PAGE 1	OF _1_

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PROJECT____Saad Waste Oil PROJECT NO. 37069190499 BORING B-18

ELEVATION 581.8 DATE 3/19/87

FIELD GEOLOGIST Karmazinski

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ample No., Type, and Depth (FT.)	Blows/ Six Inches or RQD (%)	Material Moisture and Water Depth (FT.)	Soil Density/ Consistency or Rock Hardness	LITHOLOGY		DESCRIPTION
S-1 0.0'-	9/12		M.Dense	1/1/1	0.0′-3.0′	Dark Gray Gravel Fill and Reddish Brown Silty Clay, Some Sand
1.5′ S-2	9/12	Dry				
1.5′- 3.0′	13/14		M.Dense		i i	
S-3 3.0'-	1/4		M.Dense	7 7 9	3.0'-5.0'	Reddish Brown Sandy Silt; Some Clay and Trace Med. Gray Gravel
4.5' S-4	8/8			1 1 1		and materials and, and a
4.5'- 6.0'	10/12	Moist	M.Dense	3/3/	5.0′-6.5′	Debris-Wood and Reddish Brown Silty Clay, Some Oil Staining and Odor
R-1 6.0'- 8.5'		18/		1/3///	6.5′-8.5′	Gravel and Sand, Trace Silt and Clay, Oil
		Wet	<u> </u>			BOB 8.5' Rock 8.5'
		1				NOCK 6.5
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REMARKS _	Drilling Method - Auger	BORING	B-18	
	Casing - Well Installed			
_		PAGE 1	OF 1	

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 PROJECT
 Saad Waste Oil

 PROJECT NO.
 37069190499
 BORING
 B-19

 ELEVATION
 580.3
 DATE
 3/20/87

 FIELD GEOLOGIST
 Karmazinski

	iample No., Type, and Depth (FT.)	Blows/ Six Inches or RQD (%)	Material Moisture and Water Depth (FT.)	Soil Density/ Consistency or Rock Hardness	LITHOLOGY	DESCRIPTION
0.0	S-1 0.0'- 1.5'	16/13 15/	Dry	M.Dense		0.0'-1.0' Dark Gray Gravel Fill 1.0'-1.5' Dark Gray Gravel and Brown Clayey Silt Fill Auger Refusal 1.5' 1.5'-3.5' Boulder Zone 3.5'-7.5' Gray Clayey Silt, Trace Sand
5.0'						Air Rotary 1.5'-16.5'
10.0						7.5'-16.5' Reddish Brown Clayey Silt, Some Sand
15.0			∇ .			Rock 16.5' BOB 18.0'
20.0						

REMARKS	Drilling Methods - Auger to 1.5', Air Rotary to 16.5'	BORING_	B-19
	Casing - Temporary		
		PAGE 1	OF _1_

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PROJECT Saad Waste Oil

PROJECT NO. 37069190499 BORING B-20

ELEVATION 581.1 DATE 3/20/87 FIELD GEOLOGIST Karmazinski

,	No., Type, and Depth (FT.)	Blows/ Six Inches or RQD (%)	Material Moisture and Water Depth (FT.)	Soil Density/ Consistency or Rock Hardness	LITHOLOGY	DESCRIPTION
0.0	S-1 0.0'-	3/15		V. Stiff	- 1 · 1	0.0'-0.5' Dark Gray Gravel Fill 0.5'-6.0' Reddish Brown Clayey Silt and Dark
	1.5' S-2	15/9			<u></u>	Gray Gravel Fill, Mottled
	1.5′- 3.0′	27/29	Damp	V.Stiff	100	
	S-3 3.0'-	26/14			1.1.7.	
5.01	4.5' S-4	/9	∇	V.Stiff	7. ½. ½.	
	4.5'- 6.0'	4/7		Stiff	4. 4.	Auger Refusal 6.0'
						Air Rotary Drilling 6.0'-15.0'
						No Return
10 0'						
					{	
		1				
¹ 5 O′						BOB 15.0' Rock 15.0"
			-			
			4			
			†			
			1			
			1		•	
			1		4	

KEMARKS	Drilling Methods - Auger to 6.0', Air Rotary to 15.0'	BORING_	B-20
	Casing - Temporary		
		PAGE 1	OF _1_

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PROJECT Saad Waste Oil PROJECT NO. <u>37069190499</u> BORING <u>B-21</u>

ELEVATION DATE 3/21/87
FIELD GEOLOGIST Karmazinski

ample No., Type, and Depth (FT.)	Blows/ Six Inches or RQD (%)	Material Moisture and Water Depth (FT.)	Soil Density/ Consistency or Rock Hardness	LITHOLOGY	DESCRIPTION	
S-1 0.0'-	12/50/5*	Dry	V.Dense		0.0'-2.75' Dark Gray Gravel Fill	7
11" S-2	/14		V.Dense			
1.5'- 2.75'	38/50/3*	Wet			Auger Refusal @ 2.75'	ĺ
					Air Rotary Drilling 2.75' - 18.0'	1
·		4			·No Return	Ì
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	 				BOB 18.0' Rock 18.0'	\dashv
				1		
0.				1		
		1				
		7		1		
		7		1		
	 	4				

REMARKS	Drilling Methods - Auger to 2.75', Air Rotary to 18.0'	BORING	B-21	
	Casing - Temporary			
		PAGE 1	OF 1	

APPENDIX C

9/86 SAMPLING PROGRAM LAB RESULTS

ENVIRESPONSE, INC.

ENVIRONMENTAL EMERGENCY RESPONSE UNIT GSA RARITAN DEPOT, WOODBRIDGE AVENUE, BUILDING 209, BAY F. EDISON, N.J. 08837 (201) 548-9660

WATER ANALYSIS FOR SAAD WASTE OIL SITE

Nashville, TN

Project No. 3-70-69190499

October 23, 1986

10/23/86

Submitted to: G. Prince

USEPA-RCB

Edison, NJ

Submitted by:

Enviresponse, Inc.

EERU/Project Manager

D. Chen, Ph.D.

EI-EERU S&A Section Chief

pt/6774D:0292D

Analysis by:

Clayton

Environmental Consultants

Reviewed by:

Janet Cullinane

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SECTION V

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SECTION VII

Oil Fingerprinting Chromatograms

SECTION VIII

Service Laboratory Correspondence

SECTION IX

Chain of Custody Records

INTRODUCTION

On September 13, 1986, 10 water samples and one oil sample from the Saad Waste Oil Site in Nashville, Tennessee were received by Enviresponse, Inc. They were submitted to Clayton Environmental Consultants for priority pollutant volatile organics, PCB/Pesticides, and Base Neutral/Acid Extractables analyses plus chlorides, bromides, and 15 metals. In addition, oil fingerprinting analyses were performed.

PROCEDURES

All priority pollutant organics and metals analyses were conducted in accordance with Contract Lab Program (CLP) protocols. Method blank results for all priority pollutant parameters were below the required limit of detection.

Volatile Organics Analysis: All water samples were analyzed by purge and trap-GC/MS. The oil sample was dissolved in methanol and a portion of the methanol was injected into water for purge and trap-GC/MS analysis.

PCB/Pesticides Analysis: Water samples were serially extracted with methylene chloride, concentrated to a final volume of 1 ml, and solvent exchanged with iso-octane. The oil sample was dissolved in iso-octane. All samples were analyzed by electron capture detector-gas chromatography (ECD-GC). GC/MS confirmation was not performed for sample parameters which were undetected or below the method detection limit for GC/MS. Confirmation of PCBs in sample 7334, oil and water, were performed using capillary column ECD-GC.

Base Neutral/Acid Extractables: Water samples were serially extracted with methylene chloride after treatment with NaOH to raise the pH to 12. The water was then acidified to a pH less than 2 and serially extracted with methylene chloride. The extracts were combined and concentrated to a final volume of 1 ml. The oil sample was diluted with methylene chloride. Sample extracts were then analyzed by GC/MS.

Metals: The water samples were analyzed according to EPA Document 600-4-79-020, Methods for the Examination of Water and Wastewater. The oil sample was analyzed according to EPA Document SW 846, Method 3050, Test Methods for Evaluating Solid Waste.

Chlorides/Bromides: The analysis of the water samples was performed according to EPA Document 600-4-790-20, Method 300.1, Methods for the Examination of Water and Wastewater.

Oil Fingerprinting: The water samples were extracted with Freon prior to flame ionization detector-gas chromatography (FID-GC) analysis. The oil sample was diluted using Freon. No. 2 diesel fuel was diluted with Freon to various concentrations and analyzed by FID-GC. The chromatograms of the oil and water extracts were analyzed and compared to the diesel fuel chromatograms.

Results and detection limits for the above described analyses are presented in Tables 1-11.

Table 1. Detection Limits for Volatile Organics Analysis

Parameter	Detection Limit (water) ug/1	Detection Limit (oil) ug/g
Chloromethane	10	50
Bromomethane	10	50
Vinyl Chloride	10	50
Chloroethane Chloroethane	10	50
Methylene Chloride	5	25
Trichlorofluoromethane	5 1 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	25
1,1-Dichloroethylene	5	25
1,1-Dichloroethane	5	25
Trans-1,2-Dichloroethylene	5	25
Chloroform	1	25
1,2-Dichloroethane	5	25
1,1,1-Trichloroethane	5	25
Carbon Tetrachloride	5	25
Bromodichloromethane	5	25
1,2-Dichloropropane	7	35
Trans-1,3-Dichloropropylene	5	25
Trichloroethylene	5	25
Dibromochloromethane	5	25
1,1,2-Trichloroethane	5	25
Benzene	5	25
cis-1,3-Dichloroporpane	5	25
2-Chloroethylvinyl ether	10	50
Bromo form	5	25
Tetrachloroethylene	5	25
Toluene	1	25
Chlorobenzene	5	25
Ethylbenzene	5 5 1 5 5	25
1,3-Dichlorobenzene	15	75
1,4-Dichlorobenzene	15	75
1,2-Dich]orobenzene	7	35

Table 2. Results of Volatile Organics Analysis

Sample No.	Parameter	Concentration
Water		(reported as ug/1)
7331	Trichloroethylene	< 5
7332	None Detected	
7333	None Detected	
7334	Vinyl chloride Methylene chloride l,l-Dichloroethane Trans-,2-dichloroethylene l,l,l-Trichloroethane Trichloroethylene Tetrachloroethylene Toluene Ethyl benzene	9800 5500 1700 52000 6300 3000 9600 4600 500
7335	Chloroform Toluene	< 1 < 1
7341	Chloroethane Methylene chloride 1,1-Dichloroethane	130 6.0 8.0
7342	None Detected	
7344	Trans-1,2-dichloroethylene Tetrachloroethylene	<5 6.0
7345	Trans-1,2-dichloroethylene Trichloroethylene Tetrachloroethylene	√5 7.0 6.0
7346	Trans-1,2-dichloroethylene Toluene	< 5 < 5
7353	None Detected	•••

Table 2. Results of Volatile Organics Analysis (Cont'd)

Sample No.	Parameter	Concentration
011		(reported as ug/g)
7334	Vinyl chloride Methylene chloride 1,1-Dichloroethane Trans-1,2-dichloroethylene 1,1,1-Trichloroethane Trichloroethylene Tetrachloroethylene Toluene Ehtyl benzene	290. 670. 130 4200. 1700. 4800 4800. 1300.

Table 3. Detection Limits for PCB/Pesticides Analysis

Parameter	Detection Limit (water) ug/l	Detection Limit (oil) ug/kg
← BHC	.05	78
₿ BHC	.05	78
& BHC	.05	78
& BHC (Lindane)	.05	78
Heptachlor	.05	78
Aldrin	.05	78
Heptachlor Epoxida	.05	78
Endosulfan I	.05	78
Dieldrin	.10	160
4.4'-DDE	.10	160
Endrin	.10	160
Endosulfan II	.10	160
4,4'-DDD	.10	160
Endosulfan Sulfate	.10	160
4,4'-DDT	.10	160
Methoxych1or	.50	780
Endrin Ketone	.10	160
Chlordane	.50	780
Toxaphene	1.0	1600
Aroclor 1016	.50	780
Aroclor 1221	.50	780
Aroclor 1232	.50	780
Aroclor 1242	.5	780
Aroclor 1248	.5	780
Aroclor 1254	1.0	1600
Aroclor 1260	1.0	1600

Table 4. Results of PCB/Pesticides Analysis

Sample No.	Parameter	Concentration ·
Water		(reported as ug/l)
7332	None Detected	
7333	None Detected	
7334	Aroclor 1242 Aroclor 1260	130. 74
7335	None Detected	
7341	None Detected	
7342	None Detected	
7344	None Detected	
7346	None Detected	
7353	None Detected	
011		(reported as ug/g)
7334	Aroclor 1242 Aroclor 1260	36.0 17.0

Table 5. Detection Limits for Base Neutral/Acid Extractables Analysis

Parameter	Detection Limit (water) ug/l	Detection Limit (oil) ug/kg
N-nitrosodimethylamine	11	120
Phenol	10	110
bis(2-chloroethyl)ether	10	110
2-Chlorophenol	10	110
1,3-Dichlorobenzene	10	110
1,4-Dichlorobenzene	10	110
1.2-Dichlorobenzene	10	110
ois(2-Chloroisopropyl)ether	10	110
N-nitroso-di-n-propylamine	10	110
Hexach loroethane	10	110
Ni trobenzene	10	110
Isophorone	10	110
2-Ni trophenol	10	110
2,4-Dimethylphenol	10	150
bis(2-Chloroethoxy)methane	10	110
2,4-Dichlorophenol	10	110
1,2,4-Trichlorobenzene	10	110
Naph thalene	10	150
Hexachlorobutadiene	10	110
2,4,6-Trichlorophenol	10	110
2-Chloronaphthalene	10	110
Dimethyl phthalate	10	110
Acenaph thylene	10	110
Acenaph thene	10	110
2,4-Dinitrophenol	50	560
4-Ni trophenol	50	560
2,4-Dinitrotoluene	10	110
2,6-Dinitrotoluene	10	110
Diethylphthalate	10	110
4-Chlorophenyl-phenylether	10	110
F1 uorene	10	110
4,6-Dinitro-2-methylphenol	50	560
N-Ni trosodi ph en yl amine	10	110
4-Bromophenyl-phenylether	10	110
Hexachlorobenzene	10	110
Pentachlorophenol	50	560
Pentachiorophenoi Phenanthrene	10	110
rnenanthrene Anthracene	10	110
	10	110
Di-n-butylphthalate	10	110
Fiuoranthene	160	1800
Benzidene	10	110
Pyrene	10	110
Butylbenzylphthalate 3,3'-Dichlorobenzidene	28	310

Table 5. Detection Limits for Base Neutral/Acid Extractables Analysis (Cont'd)

Parameter	Detection Limit (water) ug/l	Detection Limit (oil) ug/kg
Benzo(a)anthracene	10	110.
bis(2-ethylhexyl)phthalate	10	110
Chrysene	10	110.
Di-n-octylphthalate	10	110.
Benzo(b)fluoranthene	11	120.
Benzo(k)fluoranthene	10	110.
Benzo(a)pyrene	10	110.
Indeno(1,2,3-cd)pyrene	13	150.
Dibenzo(a,h)anthracene	16	180.
Benzo(g,h,i)perylene	17	190

Table 6. Results for Base Neutral/Acid Extractables Analysis

Sample No.	Parameter	Concentration
Waters		reported as ug/l
7332	Diethylphthalate*,** bis(2-ethylhexyl)phthalate	<10. 78.
7333	Diethylphthalate*,** Di-n-butylphthalate*,**	<10. <10.
7334	Phenol 2,4-Dimethylphenol Napthalene** 4-Chloro-3-methylphenol** bis(2-ethyl hexyl)phthalate	1900. 4900. 150. 160. 180.
7335	None Detected	
7341	Diethylphthalate*,** bis(2-ethylhexyl)phthalate Di-n-octylphthalate**	< 10. 22. < 10
7342	Diethylphthalate	<10
7344	Diethylphthalate*,** bis(2-ethylhexyl)phthalate	<10 <10
7345	Di-n-butylphthalate** bis(2-ethylhexyl)phthalate	∠10 72.
7346	Diethylphthalate*,**	< 10
7353	Phenol** Fluorene** Butylbenzylphthalate bis(2-ethylhexyl)phthalate Di-n-octyl phthalate	<10 <10 12. <10 <10

^{*} Compound was also detected in the method blank. ** Yalue is below the limit of quantification.

Table 6. Results for Base Neutral/Acid Extractables Analysis (Cont'd)

Sample No.	Parameter	Concentration		
011		reported	as ug/g	
7334	Naph thal ene	150		
	2,4-Dimethylphenol	150		
	Hexachlorobutadiene**	20		
	Fluorene**	24		
	Phenanthrene**	92		
	Anthracene**	11		
	Fluoranthene**	18		
	Pyrene**	18		
	Butylbenzylphthalate**	27		
	Bis(2-ethyl hexyl)phthalate	410		

^{*}Compound was also found in the method blank.

^{**}Value is approxmate due to its proximity to the detection limit.

Table 7. Detection Limits for Metals Analysis

(Concentration reported as mg/l)

Parameter	Total Concentration	Dissolved Concentration		
Arsenic	.001	NA NA		
Al uminum	.10	.20		
Barium	.03	NA		
Beryllium	.003	NA		
Boron	2.0	NA		
Cadmium	.003	NA		
Chromium	.005	NA		
Copper	.005	NA		
Iron	.005	.01		
Lead	.02	NA		
Manganese	.005	.01		
Nickel	.01	NA		
Selenium	.002	NA		
Vanadium	.10	NA		
Zinc	.005	NA		

NA denotes not analyzed

Table 8. Results of Total Metals Analysis - Waters

Concentrations reported in mg/l

Parameter	Sample No.									
	7346 (Blank)	7332	7333	7334	7335	7353	7341	7342	7344	7345
Arsenic	ND	.003	ND	.14	ND	.012	.008	.001	ND	ND
Aluminum	ND	7.8	.10	.20	.10	6.5	4.1	.40	.20	.20
Barium	.060	.11	ND	.44	ND	. 10	.090		ND	ND
Beryllium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Boron	3.0	ND								
Cadmium	.009	.009	.007	.026	.006	.008	.005	.005	.006	.006
Chromium	ND	.019	ND	.005	ND	.016	.030	ND	ND	ND
Copper	.010	.032	.011	.016	.010	.033	.021	.011	.010	.007
Iron	. 30	7.4	.84	38.	. 30	9.3	20.	1.2	. 18	.35
Lead	.12	.10	.080	.080	.060	.090	.080	.060	.080	.060
Manganese	.017	1.8	1.7	31.	.019	1.4	1.9	.74	.065	.065
Nickel	.020	.080	.050	.11	.030	.050	.080	.020	.030	.030
Selenium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vanadium	.2	ND								
Zinc	.018	.091	.025	.043	.017	6.5	4.1	.40	. 20	.20

ND denotes not detected

Table 8. Results of Metals Analysis - 011
(Concentrations reported as ug/g)

Sample No. 7334

Parameter	Concentration	Detection Limit
Aluminum	1000	50.
Arsenic	8.4	.50
Barium	54.	15.
Beryllium	ND	2.0
Boron	ND	750
Cadmium	4.0	2.0
Chromium	30.	3.0
Copper	7	3.0
Iron	711	3.0
Lead	23.	10.
Manganese	78.	3.0
Nickel	5 .5	5.0
Selenium	ND	1 . 0
Vanadium	ND	50 .
Zinc	44.	3.0

ND denotes not detected

Table 9. Results of Dissolved Metals Analysis

Concentrations in mg/l

Parameter	Sample No.								
	7346 (Blank)	7332	7333	7335	7353	7341	7342	7344	7345
Aluminum Manganese Iron	ND .020 .20	.30 .950 .34	ND 1.8 .58	ND .030 .17	ND 1.3 1.0	ND 1.8 1.7	ND .12 .27	.30 .080 .38	ND .070 .22

ND denotes not detected

Table 10. Results of Chlorides and Bromides Analysis
(Concentrations in mg/1)

Sample No.	Chlorides	Bromides	
Method Blank	ND	ND	
7332	4.0	ND	
7333	11.	ND	
7334	310	11.	
7335	6.4	ND	
7341	22.	ND	
7342	64	ND	
7344	ĭĭ.	ND	
7345	ii.	ND	
7346	ND	ND	
7353	10.	ND	

ND denotes not detected. Detection limits were .5 mg/l for chlorides and 1.0 ug/l for bromides.

Table 11. Matching of Oil Fingerprinting Analysis to Diesel Fuel No. 2

Results
Negative
Negative
Negative
Positive
Positive
Negative

QA/QC PROCEDURES

Volatile Organics Analysis: Three surrogate standards were spiked into each sample prior to analysis to ensure the efficiency of the purge and trap unit. Recoveries for these standards are presented in QA/QC Table 12. The recoveries for water ranged from 85% - 106% and for the oil sample from 84% - 106%.

One water sample (7331) and the oil sample (7334) were analyzed in duplicate to determine sample homogeneity. The results are presented in QA/QC Table 13. Methylene chloride was detected in the water sample but not in the duplicate. Methylene chloride was also detected in the method blank. This is a common laboratory solvent and is often seen as contamination during sample analysis. Its presence at detection limit levels in one sample and not in a duplicate can be disregarded since the background in a laboratory can vary. The relative percent differences for the oil sample ranged from 0 to 16 indicating good sample homogeneity.

A water sample, 7346, and the oil sample, 7334, were spiked with five volatile organics to determine any matrix interferences that may be present. These results are listed in QA/QC Table 14. Recoveries ranged from 86% - 106% for the water and from 90% - 120% for the oil and were within the QA/QC limits for this laboratory.

PCB/Pesticides Analysis: All water samples and standards were spiked with dibutyl chlorendate to assure proper instrument performance. These surrogate standard results are presented in QA/QC Table 15. The recovery for two samples, 7332, its duplicate, and 7334, could not be calculated due to a contamination peak that coeluted with dibutyl clorendate. All other recoveries were within the QA/QC limits of the laboratory. CLP protocols do not require surrogate spiking for oil matrices.

One water sample, 7332, was analyzed in duplicate to determine sample homogeneity. PCBs and pesticides were undetected in both. The oil sample, 7334, was also analyzed in duplicate. Results for the oil sample are presented in QA/QC Table 16. The relative percent difference for Aroclor 1242 and Aroclor 1260 were 2.8 and 6.1, respectively.

One water sample was spiked with six pesticides to determine the presence of matrix interferences. Results are presented in QA/QC Table 17. All compounds except 4,4'-DDT were within the laboratory's QA/QC limits.

Base Neutral/Acid Extractables Analysis: All water samples and method blanks were spiked with three surrogate standards to ensure extraction efficiency. The results are presented in QA/QC Table 18. Surrogate spiking was not required for the oil sample since the sample preparation does not include an extraction process. Recoveries for water sample 7334 could not be determined due to high levels of phenol and 2,4-dimethyl phenol which required dilution of the extract prior to analysis. All other surrogate standard recoveries were within the QA/QC limits of the laboratory.

The results of duplicate analyses of water sample 7332 and oil sample 7334 are presented in QA/QC Table 19. Relative percent difference for diethylphthalate was not calculated because its concentration was less than the method limit of quantification. Bis(2-ethylhexyl)phthalate was found at 78 ug/l in the sample but undetected in the duplicate. Reproducibility for three compounds above the limit of quantification found in the oil sample ranged from 0-6.4 relative percent difference.

Results of the matrix spike analysis for water sample 7346 and the oil sample are presented in QA/QC Table 20. All recoveries were within the QA/QC limits of the laboratory.

Metals Analysis: The results of duplicate metals analyses are presented In QA/QC Table 21. Relative percent differences for the water ranged from 0-26. For the oil sample, relative percent difference ranged from 0 to 25.

One water sample was spiked with fifteen metals to determine any matrix interferences. Results are presented in QA/QC Table 22. Recoveries ranged from 93-134%. The oil sample was also spiked with fifteen metals as shown in QA/QC Table 22. Recoveries ranged from 61 to 112% for all compounds except selenium. Recovery for selenium was 3%. Historical data for selenium in oil indicates low recoveries are usual.

Chlorides/Bromides Analysis: Duplicate chlorides and bromides results are presented in QA/QC Table 23. Water sample 7341 was analyzed in duplicate and showed no relative percent difference for chlorides. Bromides were undetected in the sample and duplicate.

Matrix spike results for chlorides and bromides are presented in QA/QC Table 24. One sample, 7341, was spiked with both analytes and two other water samples, 7344 and 7335, were spiked with chlorides and bromides, respectively. Recoveries ranged from 96-110%.

Oil Fingerprinting: Two deionized water samples were spiked with 5 ul of pure diesel fuel oil to determine extraction efficiency. Quantification of the oil was performed by selecting the twelve highest peak area responses and comparing to a diesel fuel standard. Recoveries were 110% and 114%.

QA/QC Table 12. Surrogate Standard Recoveries for Volatile Organic Analysis

	% Recovery					
Sample No.	Toluene-D8	4-Bromofluorobenzene	1,2-Dichloroethane-D4			
Wa ter		**************************************				
7331	103.	106.	99.			
7332	101.	98.	102.			
7332 (Duplicate)	101.	100.	102			
7333	96.	100.	97.			
7334 (water)	94.	100.	99.			
7335	101.	98.	97.			
7341	91.	106.	101.			
7342	98.	100.	93.			
7344	105.	101.	93.			
7345	100.	102.	92.			
7346	102.	99.	100.			
7353	99.	102.	85.			
7346 MS	99.	99.	100.			
Method Blank I	98.	101.	101.			
Method Blank II	100.	104.	90.			
Method Blank III	101.	103.	95.			
011						
7334	87.	98.	95.			
7334 MS	97.	104.	87.			
7334 (Duplicate)	102	106.	84.			
Method Blank	93.	107.	86.			

QA/QC Table 13. Results of Duplicate Volatile Organics Analysis

Parameter	Run 1	Run 2	RPD
Sample No. 7331 (water) - Con	centrations	reported a	s ug/l
Methylene chloride	∠ 5	ND	
Sample No. 7334 (ofl) - Conce	entrations r	eported as	ug/g
Vinyl chloride	290.	300.	3.4
Methylene chloride	670.	570.	16.
1,1-Dichloroethane	130.	130.	0.
Trans-1,2-dichloroethylene	4200.	4000.	4.9
1,1,1-Trichloroethane	1700.	1700.	0
Trichloroethylene	4800.	4900.	2.1
Tetrachloroethylene	4800.	5600.	15.
Toluene	1300.	1400.	7.4
Ethyl benzene	230.	270.	16.

RPD denotes relative percent difference

QA/QC Table 14. Results of Matrix Spike Volatile Organics Analysis

Parameter	Spike Conc.	Sample Conc.	Recovered Conc.	· % Recovery
Sample No. 7346 (water	r) – concent	rations repo	rted as ug/l	
1,1-Dichloroethane	50.	ND	43.	86.
Trichloroethylene	50.	ND	52.	104.
Ch1orobenzene	50.	ND	51.	102.
Tol uene	50.	.6	50.	99.
Benzene	50.	ND	53.	106.
Sample 7334 (oil) - co	oncentration	s reported a	s ug/g	
1.1-Dichloroethane	3100	ND	2800	90.
Trichloroethylene	3100	4800	8500	120.
Ch1 orobenzene	3100	ND	3300	106.
Toluene	3100	1300	4500	103.
Benzene	3100	ND	2900	94.

QA/QC Table 15. Surrogate Standard Recoveries for PCB/Pesticides Analysis

Sample No.	Parameter	% Recovery
7332	Dibutyl Chlorendate	*
7332 Duplicate	Dibutyl Chlorendate	*
7333 ·	Dibutyl Chlorendate	97.0
7334	Dibutyl Chlorendate	*
7335	Dibutyl Chlorendate	88.0
7341	Dibutyl Chlorendate	53.0
7342	Dibutyl Chlorendate	86.0
7344	Dibutyl Chlorendate	91.0
7345	Dibutyl Chlorendate	90.0
7346	Dibutyl Chlorendate	102.0
7346 MS	Dibutyl Chlorendate	86.0
7353	Dibutyl Chlorendate	101.0
Method Blank	Dibutyl Chlorendate	93.0

^{*}Surrogate standard recovery could not be calculated due to coelution of dibutyl chlorendate with interference peak.

QA/QC Table 16. Results of Duplicate PCB/Pesticides Analysis

Concentrations in ug/g

Parameter	Run 1	Run 2	RPD
Sample 7334 (01	1)		·
Aroclor 1242 Aroclor 1260	36. 17.	35. 16.	2.8 1.06

RPD denotes relative percent difference

QA/QC Table 17. Results of Matrix Spike PCB/Pesticides Analysis

Concentrations reported as ug/l

Parameter	Spike Conc.	Sample Conc.	Recovered Conc.	% Recovery
Sample No. 73	32 (water)			
Lindane ·	.20	ND	.19	95.
Heptachlor	.20	ND	.14	70.
Aldrin	.20	ND	.12	60.
Dieldrin	.50	ND	.43	86.
Endrin	.50	ND	. 44	88.
4.4'-DDT	.50	ND	.66	130.

QA/QC Table 18. Surrogate Standard Recoveries for Base Neutral/Acid Extractables

		% Recovery	
Sample No.	2-F1 uorophenol	2-Fluorobiphenyl	2,4,6-Tribromopheno
7332	50.	63.	48.
7332 (duplicate)	51.	59.	50.
7333	58.	66.	81.
7334 (water)	*	*	*
7334 (oil)	not required	not required	not required
7335	57.	80.	65.
7341	53.	76.	71.
7342	55.	69.	68.
7344	52.	78.	58.
7345	47	87.	62.
7346	62.	57.	96.
7346 MS	60.	65.	76.
7353	56.	66.	58.
Method Blank	59.	70.	82.

^{*}Surrogate standards were diluted out due to high concentrations of phenol and 2,4-dimethylphenol in sample.

QA/QC Table 19. Results of Duplicate Base Neutral/Acid Extractables Analysis

Parameter	Run 1	Run 2	RPD
Sample 7332 (water) - concen	trations re	ported as ug	ı/1
Diethylphthalate	<10	∠ 10	
Bis(2-ethylhexyl)phthalate	78	ND	
Sample 7334 (oil) - concentr	ations repo	rted as ug/g	ľ
2,4-Dimethylphenol	150.	160.	6.4
Naph thal ene	150.	150.	0
Hexachlorobutadiene	<110.	4110.	
Fluorene	<110.	< 110.	
Phenanthrene	< 110.	₹110.	
Anthracene	∠110.	\$110.	
Fluoranthene	<110.	ND	
Pyrene	4110.	<110.	
Butylbenzylphthalate	< 110.	≼ 110.	
Bis(2-ethylhexyl)phthalate	410.	400.	2.5

QA/QC Table 20. Results of Matrix Spike Base Neutral/Acid Extractables Analysis

Concentrations reported as ug/1

Sample 7346 water:

Parameter	Spike Conc.	Sample Conc.	Recovered Conc.	% Recovery
1,2,4-Trichlorobenzene	130	ND	69.	53.
Acenapthene	130	ND	89.	68.
2.4-Dinitrotoluene	130	ND	120	92.
Pyrene	130	ND	150	115
N-nitroso-di-n-propylamine	130	ND	89.	68.
1.4-Dichlorobenzene	130	ND	66.	51.
Pentachlorophenol	270	ND	240	89
Phenol	270	ND	120	44.
2-Chlorophenol	270	ND	200	73.
4-Chloro-3-methylphenol	270	ND	230	85.
4-Nitrophenol	270	ND	100	37.

QA/QC Table 21. Results of Duplicate Metals Analysis

Concentrations reported as mg/l

Parameter	Run 1	Run 2	RPD
Total Metals:	Sample No.	7335 (wate	 r)
Arsenic	ND	ND	
Aluminum	.1	.1	0
Barium	ND	ND	
Beryllium -	ND	ND	
Boron	ND	ND	
Cadmium	.006	.006	0
Chromium	ND	ND	
Copper	.010	.008	22.
Iron	.30	.39	26.
Lead	.06	.06	0
Manganese	.019	.017	11.
Nickel	.03	.03	0
Selenium	ND	ND	
Vanadium	ND	ND	••
Zinc	.017	.018	5.7
Dissolved Meta		7341 (wate	
Manganese Iron	1.8 1.7	1.8 1.7	0
Manganese Iron Aluminum	1.8 1.7 ND	1.8 1.7 ND	0 0
Iron	1.7 ND	1.7 ND	
Iron Aluminum	1.7 ND Sample 733	1.7 ND	0
Iron Aluminum Total Metals:	1.7 ND	1.7 ND 4 (oil) - c	0 concentrations in ug/g
Iron Aluminum Total Metals: Aluminum Barium	1.7 ND Sample 733 8.4	1.7 ND 4 (oil) - c 8.2	O concentrations in ug/g
Iron Aluminum Total Metals: Aluminum	1.7 ND Sample 733 8.4 54.	1.7 ND 4 (oil) - c 8.2 47.	O concentrations in ug/g
Iron Aluminum Total Metals: Aluminum Barium Beryllium	1.7 ND Sample 733 8.4 54. ND ND	1.7 ND 4 (oil) - c 8.2 47. ND	O concentrations in ug/g 2.4 4.7
Iron Aluminum Total Metals: Aluminum Barium Beryllium Boron Cadmium	1.7 ND Sample 733 8.4 54. ND ND 4.0	1.7 ND 4 (oil) - c 8.2 47. ND ND 4.0	O concentrations in ug/g 2.4 4.7
Iron Aluminum Total Metals: Aluminum Barium Beryllium Boron Cadmium Chromium	1.7 ND Sample 733 8.4 54. ND ND 4.0 30.	1.7 ND 4 (oil) - c 8.2 47. ND ND 4.0 31.	O concentrations in ug/g 2.4 4.7 0
Iron Aluminum Total Metals: Aluminum Barium Beryllium Boron Cadmium Chromium Copper	1.7 ND Sample 733 8.4 54. ND ND 4.0 30. 7.0	1.7 ND 4 (oil) - c 8.2 47. ND ND 4.0	oncentrations in ug/g 2.4 4.7 0 3.3
Iron Aluminum Total Metals: Aluminum Barium Beryllium Boron Cadmium Chromium	1.7 ND Sample 733 8.4 54. ND ND 4.0 30.	1.7 ND 4 (oil) - c 8.2 47. ND ND 4.0 31. 9.0	0 concentrations in ug/g 2.4 4.7 0 3.3 25.
Iron Aluminum Total Metals: Aluminum Barium Beryllium Boron Cadmium Chromium Copper Iron Lead	1.7 ND Sample 733 8.4 54. ND ND 4.0 30. 7.0 711	1.7 ND 4 (oil) - c 8.2 47. ND ND 4.0 31. 9.0 710	0 concentrations in ug/g 2.4 4.7 0 3.3 2514 4.4 19.
Iron Aluminum Total Metals: Aluminum Barium Beryllium Boron Cadmium Chromium Copper Iron	1.7 ND Sample 733 8.4 54. ND ND 4.0 30. 7.0 711 23. 78	1.7 ND 4 (oil) - c 8.2 47. ND ND 4.0 31. 9.0 710 22.	0 concentrations in ug/g 2.4 4.7 0 3.3 2514 4.4
Iron Aluminum Total Metals: Aluminum Barium Beryllium Boron Cadmium Chromium Copper Iron Lead Manganese	1.7 ND Sample 733 8.4 54. ND ND 4.0 30. 7.0 711 23.	1.7 ND 4 (oil) - c 8.2 47. ND ND 4.0 31. 9.0 710 22. 94	0 concentrations in ug/g 2.4 4.7 0 3.3 2514 4.4 19.
Iron Aluminum Total Metals: Aluminum Barium Beryllium Boron Cadmium Chromium Copper Iron Lead Manganese Nickel	1.7 ND Sample 733 8.4 54. ND ND 4.0 30. 7.0 711 23. 78 5.5	1.7 ND 4 (oil) - c 8.2 47. ND ND 4.0 31. 9.0 710 22. 94	0 concentrations in ug/g 2.4 4.7 0 3.3 2514 4.4 19.

QA/QC Table 22. Results of Matrix Spike for Metals Analysis

Parameter	% Recovery
Sample 7335 - Water	
Arsenic	95.
Al um i num	106
Barium	126
Beryllium	101
Boron	93.
Cadmium	95.
Chromium	94.
Copper	93.
Iron	93.
Lead	95.
Manganese	134
Nickel	113
Selenium	95.
Vanadium	126
Zinc	123
Sample 7334 - 011	
Arsenic	61.
Aluminum	88.
Barium	112
Beryllium	66.
Boron	76.
Cadmium	94.
Chromium	107
Copper	100
Iron	78.
Lead	107
Manganese	100
Nickel	92.
Selenium	3.0
Vanadium	107
Zinc	89.

QA/QC Table 23. Results of Duplicate Chlorides and Bromides Analysis

Concentrations in mg/l

Sample No.	Chlorides			Brom	ides	
	Run 1	Run 2	RPD	Run 1	Run 2	RPD
7341	22.	22.	0	ND	ND	••

QA/QC Table 24. Results of Matrix Spike for Chlorides and Bromides Analysis

ample No.	% Recovery Chloride	% Recovery Bromides
7341	98.	110
7344	96.	
7335		98.

POOR LEGIBILITY

PORTIONS OF THIS DOCUMENT MAY BE UNREADABLE, DUE TO THE QUALITY OF THE ORIGINAL

ENVIRESPONSE, INC.

CHAIN OF CUSTODY RECORD

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ENVIRESPONSE, INC.

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Environmental Response Team, Environmental Protection Agency Woodbridge Ave., Edison, N.J. 08837 (201) 321-6660

Location:GR	assimere	WE	11#3			•
Collectors:	13 PM					
	mber (Consec.f's) 1353	Date Co		Y'ile	Time (24 hr)	0
SOIL		LAND.	٧	EGETATION		GROUNDWATER
Device Auger Core Split Spoon	Soil Type Rock Gravel Sand	Upland-Dry Lowland-Dry Floodplain Wetland	Old Fie Woode Farmia	d Industri	al Water Table De	
Cylinder Cup Spade	Clay Slit Muck	Gully Slope > 15° < 15°	Shrube	eous		FL
Ft. or In.	Loam Peat Color:	< 15°	DBH		In. Odor: Oit:	ILER .
	SURFACE WATER)			SAMP	LE PREPARATION
Color:	SURFACE WATER Temp pH Ft or in. FVSec	Device Kemmerer Petersen Surber Manual Net Seine Trowl Bucket	Surface Clean Oil Garbage Trash Bubbles Dead Fish Sewage Ind. Waste Float. Solids	Bottom % Ooze Sand Gravel Clay Rubble Rock Shell Organic	Container Glass Jar Plastic Jar Metal Acetate Core Paper Cap Teflon Cap Foil Cap Storage Wet Ice	LE PREPARATION Cleaning Procedure Low—s-High Concentration Detergent Wash Water Rinse Acetone Rinse Hexane Rinse Other Solvent Rinse Specify:
STREAM Width Depth Velocity FLOW DIRECTION	Temp pH Ft.	Device Kemmerer Petersen Surber Manual Net Seine Trowl Bucket	Clean Oil Garbage Trash Bubbles Dead Fish Sewage Ind. Waste	Ooze Sand Gravel Clay Rubble Rock Shell	Container Glass Jar Plastic Jar Metal Acetate Core Paper Cap Telion Cap Foil Cap Storage	Cleaning Procedure Low—s-High Concentration Detergent Wash Water Rinse Acetone Rinse Hexane Rinse Other Solvent Rinse
STREAM Width Depth Velocity FLOW DIRECTION	Temp pH Ft Ft or In. Ft/Sec Riffles 46	Device Kemmerer Petersen Surber Manual Net Seine Trowl Bucket	Clean Oil Garbage Trash Bubbles Dead Fish Sewage Ind. Waste	Ooze Sand Gravel Clay Rubble Rock Shell	Container Glass Jar Plastic Jar Metal Acetate Core Paper Cap Teflon Cap Foil Cap Storage Wet Ice Ambient	Cleaning Procedure Low—High Concentration Detergent Wash Water Rinse Acetone Rinse Hexane Rinse Other Solvent Rinse Specify:

Remarks and Site Description

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Environmental Response Team, Environmental Protection Agency Woodbridge Ave., Edison, N.J. 08837

(201) 321-6660

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Collectors: Lab Number (Consec.#'s) NO 7346 SOIL LAND Device Soil Type Upland-Dry Core Gravel Split Spoon Cylinder Cup Split Spoon Cylinder Cup Spade Muck Sign Sign Muck Sig	
SOIL LAND VEGETATION Device Soil Type Auger Core Split Spoon Cylinder Cup Spade Depth Depth Depth Device Soil Type Upland-Dry Lowland-Dry Lowland-Dry Fill Wooded Industrial Farmland Commercial Wetland Gully Herbaceous Shrube Trees Color:	
SOIL LAND VEGETATION Device Soil Type Upland-Dry Lowland-Dry Core Gravel Split Spoon Cylinder Cup Spade Sitt Depth LAND VEGETATION GROUNDWATER Water Table Depth Ft. Herbaceous% Shrubs% Shrubs% Color: Color:	
Device Soil Type Upland-Dry Lowland-Dry Honger Gravel Split Spoon Sand Cylinder Cup Spade Silt Muck Slope > 15° Trees% Color:	
Auger Core Gravel Split Spoon Cylinder Cup Spade Sitt Depth Rock Gravel Gravel Send Gravel Sitt Shrubs Trees Lowland-Dry Floodplain Farmland Commercial Farmland Farmland Findustrial Farmland Farmland Farmland Findustrial Farmland Farmland Findustrial Findustrial Findustrial Farmland Findustrial Findustr	
Core Gravel Floodplain Farmland Commercial Split Spoon Cylinder Cup Spede Silt Muck Slope > 15° Trees 6 Color:	
Split Spoon Cylinder Cup Spade Depth Sand Culty Gulty Herbaceous% Shrube Trees Color: Color:	
Spade Silt Shrubs	
Depth Muck Slope > 15° Trees% Color	
Or Peat DBH In. Oil:	
In. Color:	
SURFACE WATER SAMPLE PREPARATION	
Color: Temp Device Surface Bottom % Container Cleaning Procedure	
Odor: pH Kemmerer Clean Ooze Glass Jar Low—High Concentr Petersen Oll Sand Plastic Jar Detergent Wash	ation
STREAM Width Ft. Surber Garbage Gravel Metal Water Rinse	
Manual Trash Clay Acetate Core Acetone Rinse Ft Net Bubbles Rubble Paper Cap Hexane Rinse	
Depth or Seine Dead Fish Rock Teffon Cap Other Solvent Rinse	
Trowl Sewage Shell Foil Cap Specify:	
Velocity Ft/Sec Bucket Ind. Waste Float. Solids Storage Wat Ice	
FLOW DIRECTION Ambient	
Pools% Riffles% Dry Ice	
TRANSECT INFORMATION Compass Direction Distance Between Stations	
Letter Station #	
to to Ft	

Remarks and Site Description

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Environmental Response Team, Environmental Protection Agency Woodbridge Ave., Edison, N.J. 06837 (201) 321-6660

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Location:	Contail	from	مرد مرد	L Res	-4-	L Se 1	o:	1		.		
Collectors: GP	PLIL,CW									-		
Lab Nur	nber (Consec.#'s)	Date (Collected			Time (24 hr)						
No 7	345	O	9 112 E	र्वे ८		004	6					
SOIL		LAND	1	EGETATION		GF	OUND	WATER				
Device	Soil Type	Upland-Dry	Old Fit	eld Resider	ntial	Water Table Dep		TT	┯	FL		
Auger	Rock	Lowland-Dr				water lable beb	" <u> </u>		丄] " `		
Core	Gravel	Floodplain Wetland	Farmia	Comme	ercial		\vdash	ГТ	一	ī		
Split Spoon Cylinder Cup	Sand Cley	Guily	Herber	Seous 50	*	Sample Depth	- 1	1 1	ļ	Ft.		
Spade	Silt		Shrubi	30			_			•		
Depth	Muck	Siope >1	5° Trees	್ಲಿ	_*	Color:						
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	SURFACE WATER				<u> </u>	SAMPL!	E PREPARATION					
Color. Cles	Temp	Device	Surface	Bottom %		ntainer	Cleaning Procedure					
JE WOLK	pH	Kemmerer	Clean	Ooze		ss Jar S	Low—High Concentration Detergent Wash					
STREAM WIGHT	FL	Petersen Surber	Oil Garbage	Sand Gravel	Me!	stic Jar 🦃		er Rinse				
STREAM WINDE		Manual	Trash	Clay		etate Core	Acetone Rinse					
Depth	TTT FI	Net	Bubbles	bles Rubble Pap Fish Rock Teff age Shell Foil Vaste Organic Sto		per Cap	Hex	Hexane Rinse Other Solvent Rinse				
Debtu	or in	Seine	Dead Fish			lon Cap		••				
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Velocity	FVSec	Bucket	Float, Solids			rage						
FLOW DIRECTION		1	. 1001 001100			lice						
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Environmental Response Team, Environmental Protection Agency Woodbridge Ave., Edison, N.J. 06837 (201) 321-6660

THE IT			(301) 021 00					
Location: PLW	Sacd Site	(,)						
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	mber (Consec.#'s)		Collected			Time (24 hr)		
No	7344	0	9 1 1 8	316		1049		
SOIL		LAND	,	EGETATION		GR	OUNDWATER	
Device	Soil Type	Upland-Dry	Old Fix	eld Residen	ıtial	Water Table Book		<u> </u>
Auger	Rock	Lowland-Dr	y Woode	d Industri	لدا	Water Table Depti	"	FL
Core	Gravel	Floodplain	Farmia	ind Comme	rcial)
Split Spoon	Sand	Wetland			-	Sample Depth		Ft.
Cylinder Cup	Clay	Gully	Herba		_*	•		
Spade .	Silt		Shrubi	· —	"			
Depth	Muck	Slope >1	5° Trees		_*]			
Ft.	Loam	~ 1	DBH		٦. ١			
or in.	Peat		UBA	111	ln.	Oil:		
in.	Color				_	Device:		
	SURFACE WATER					SAMPLE	PREPARATION	
Color	Temp	Device	Surface	Bottom %	Cor	ntainer	Cleaning Procedur	•
Odor:	pH	Kemmerer	Clean	Ooze	Gla	ss Jar —	Low-High Cond	entration
	 	Petersen	Oil	Sand	Plas	stic Jar	Detergent Wash	
TEAM Width	Ft.	Surber	Garbage	Gravel	Met		Water Rinse	
<u> </u>		Manuai	M:-Trash	Clay	Ace	tate Core	Acetone Rinse	
Depth	Fi	Net	Bubbles	Rubble	•	er Cap	Hexane Rinse	
	in.	Seine	Dead Fish	Rock		ion Cap	Other Solvent Rins	•
_		Trowl	Sewage	Shell	Foil	Cap	Specify:	
Velocity	Ft/Sec	Bucket	Ind. Waste	Organic	Sto	rage		
L			Float. Solids		Wet			
FLOW DIRECTION						bient		
Pools%	Riffles%				Dry			
TRANSECT INFORMAT	· - 1	as Direction	<u> </u>			ance Between Stati	ions	
Letter Station #								!
	•		_		to [i•		Ft
Remarks and Site Descri	ption				1			
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			/	/	,moi	1		

D. Noan



Environmental Response Team, Environmental Protection Agency Woodbridge Ave., Edison, N.J. 08837 (201) 321-6660

	•		_									
Location:	AAD WA	STE OF	<u>L</u>	/ c	SX L	A	CCI				_	
Collectors:	AAO WA Walsh,	Prince									-	
	nber (Consec.#'s)	Date					Time (24 hr)				-	
					∪.		(2412)					
No	7342	CA.	7	P ₁ 3	76		092	<u>/</u>				
\$01L		LAND		1	VEGETATION		G	ROUND	WATE	A		
Device	Soil Type	Upland-Dry		Old Fi			Water Table De	n#h [П		FL	
Auger	Rock	Lowland-Dr	У	Woode		_]''	
Core	Gravel Sand	Floodplain Wetland		Farmia	and Comme	rcial			TT		- ר	
Split Spoon Cylinder Cup	Clay	Gully		Harba	ceous	%	Sample Depth		1 1	ł	Ft.	
Spade	Silt	Gully		Shrubi		- %					ر.	
	Muck	Slope >1	5°	Trees		_ %	Color.				_	
Depth Ft.	Loam	1	5°				Odor.				-	
or	Peat	•		DBH	1 1 1	ln.	Oil:					
L. In.	Color:				سلسك		Device:				-	
	SURFACE WAT	ER		<u></u>			SAMPL	E PREP	ARATIC	ON		
Color:	Temp	Device	Su	rrtace	Bottom %	Co	ntainer	Cle	ening P	rocedu	re	
Odor:	pH	Kemmerer		lean	Ooze	Gle	es Jar				centratio	
	·	Petersen		Oil	Sand	Pla	stic Jar		ergent \			
TREAM Width	Ft.	Surber	Ga	rbage	Gravel		tal		er Rins			
	Ft.	Manual		rash	Clay		etate Core		tone Ri			
Depth	or	1466		bbles	Rubble		per Cap	Hexane Rinse Other Solvent Rinse				
· . L	in.	Seine		id Fish	Rock	1	fion Cap II Cap		er sow cify:	ent run:	30	
Velocity		Trowl Bucket	_	wage Waste	Shell Organic	FO	и Сар	Spe	City.	•		
Velocity	FVS	ec Bucket		t. Solids	Organic	Sto	orage			-		
FLOW DIRECTION		1		. 30108		W	it Ice					
	Riffles%	1					nbient					
700is	TIII 7	_L	<u> </u>			Dr	y ice					
TRANSECT INFORMATI		pass Direction				Die	tance Between St	ations				
Letter Station #	- Com	ipass Direction									-	
					1 1 1	to	- 1 1	is	1 1		Ft	
		· Street	_	<u> </u>							J	
Remarks and Site Descri	ption LAGNT	50mg 81	2									
٠	5	Spring	J		JAEL	1	-					
in him	•		-		1ALL 4	page	er					
releases when			4	رسمه ۱۱	11.	~/ ₁ .	1 chain	•			•	
A COM TOWN	Concrete _		1E	-Arms 170	n, out	J- 11	ns coolborns	5				
alear Brok	LALCON	12 111.	_ (Nevir	sely.		separtor					
" nur med	- Cuv	1. Smiller	%	! wh	w 4 .		• 7					
her when	manam /	140.	70 M	6 0,	Devel							
disturbed &	1700,000	when ful	<i>D</i> _	•								
ี "ม	An full	11 N.	£	V.								
•	T	Normally	•		3	AM	Pke of w	at				
some sedime	ton	persic	انت	ŭ		<i>ur 1</i> \	T W	^				
Top of 6" of 0	To the	pipe					under a	ناگ	2	,		
م الله الم	mr" m	•		7		٨		. ,	S'I	4-		
イルれられ	the down	lair	47	•	11 0: 00	א ס	trough la	LOOY	مولا 🔻	W.		
la ao'.	thro a	• •			11 Juges	_ ^			. •	•		
Pres 10.	•				•				• :			



Environmental Response Team, Environmental Protection Agency Woodbridge Ave., Edison, N.J. 98837 (201) 321-6660

Location:	AAD WA	ste Oi	<u> </u>	SXX	ail	road		-
Collectors:								•
Lab Nur	nber (Consec.#'s)		ollected			Time (24 hr)		
NO 7	341	Se Se	1 12/2	16		080	○	
SOIL		LAND	٧	EGETATION		G	ROUNDWATER	
Device	Soil Type	Upland-Dry	Old Fie			Water Table Dep	m	FL
Auger Core	Rock Gravei	Lowland-Dry Floodplain	Woode Farmla]''
Split Spoon	Sand	Wetland	- Errine			Sample Depth		7-
Cylinder Cup	Clay	Gully	Herbac	eous	_*	Sample Deptin		FL.
Spade .	Silt	a. a	Shrube		- %	0.15		
Depth	Muck	Slope > 15 < 15	Trees		%			-
Ft. or	Loam Peat	C 13	ОВН		In.	Oil:		-
1n.	Color:					Device:		- -
	SURFACE WAT	ER	<u></u>		_	SAMPL	E PREPARATION	
Color:	Temp	Device	Surface	Bottom %	Co	ntainer	Cleaning Procedu	re
Odor:	pH	Kemmerer	Clean	Ooze		iss Jar	Low-High Con	centration
	'TTT	Petersen	Oil	Sand		stic Jar	Detergent Wash	
EAM Width	Ft.	1 00.00.	Garbege	Gravel Clay	Me	etate Core	Water Rinse Acetone Rinse	
,	Ft Ft	Manual Net	Trash Bubbles	Rubble		per Cap	Hexane Rinse	
Depth	or	Seine	Dead Fish	Rock		flon Cap	Other Solvent Rin	80
	<u></u>	Trowl	Sewage	Shell	Fo	il Cap	Specify:	
Velocity	FVS	ec Bucket	Ind. Waste	Organic	Sto	orage		
FLOW DIRECTION		1	Float. Solids			it los		
	Riffles%				1	nbient v Ice		
TRANSECT INFORMAT	ION	ll		<u></u>		,		
		npass Direction			Dis	tance Between St	ations	
Letter Station #	•				to		ia T	T _{Ft}
								J.,
Remarks and Site Descr	F. + Wel	J 551	ん生					
	lath on	1/11/86	TOC-B	ttm	51,	,6'		
	,		Toc-	WL	15.	٥'		
			Grad-	- بر- 	1	n /		
			Grad-	700	1.	1		



Environmental Response Team, Environmental Protection Agency Woodbridge Ave., Edison, N.J. 08837 (201) 321-6660

Location:G	ASSMER E	VATURE A	4eK		
	Halsh/Princ				
Lab Nur	mber (Consec.#'s)	Date Collec	ted	Time (24 hr)	
No 7	335	09	Piy 816	183	3
SOIL		LAND	VEGETATION	G	ROUNDWATER
Device Auger	Soil Type Rock	Upland-Dry Lowland-Dry	Old Field Resider Wooded industri	Water Table De	oth Ft.
Core	Gravel	Floodplain	Farmland Comme	rcial	
Split Spoon Cylinder Cup	Send Clay	Wetland Gully	Herbaceous	Sample Depth	FL
Spade	Silt	01000 > 459	Shrubs	_% Color	
Depth	Muck Loam	Slope > 15* < 15*	Trees		
Ft. or in.	Peet Color:	\	DBH	In. Oil:	
	SURFACE WATER	······································		SAMPL	E PREPARATION
Color.	Temp	Device Su	urface Bottom %	Container	Cleaning Procedure
Odor:	pH		Clean Ooze	Gless Jar Plastic Jar	Low—>High Concentration Detergent Wash
STREAM Width	Ft.	Surber Ga	Oil Sand arbage Gravel Trash Clay	Metal Acetate Core	Water Rinse Acetone Rinse
Depth	Ft.		ubbles Rubble	Paper Cap	Hexane Rinse
Сери	or in.	1	nd Fish Rock	Teflon Cap	Other Solvent Rinse
Velocity	FVSec		rwage Shell . Waste Organic	Foil Cap	Specify:
	FVSec	,	t. Solids	Storage Wet Ice	
FLOW DIRECTION				Ambient	
Pools%	Riffles%			Dry ice	
TRANSECT INFORMAT		ass Direction		Distance Between St	ations
Letter Station #	•				
		دينانه واستندينه		to	inFt
Remarks and Site Descr	iption Sprin	z 2 - s	of entry	rood in	poping bo#2
		•		pe inade l	
		llen	a gal,	المنط	
		٢	0 /	er if e.	



Environmental Response Team, Environmental Protection Agency Woodbridge Ave., Edison, N.J. 08837 (201) 321-6660

Location:	HAD OIL'	WELL				
Collectors:	K GP					
NO Lab Nu	mber (Consec.#'e) 7334	Date Co		říle	Time (24 hr)	
\$OIL		LAND	V	EGETATION		BROUNDWATER
Device Auger Core	Soil Type Rock Gravel	Upland-Dry Lowland-Dry Floodplain	Old Fie Woode Farmla	d Industrie	Water Table De	
Split Spoon Cylinder Cup Spade	Sand Clay Silt Muck	Wetland Gully Slope > 15°	Herbec Shrubs Trees		Sample Depth Solution Solution	Ft.
Depth Ft. or in.	Loam Peat Color:	< 15'			In. Odor: Oil: Device:	ALER
	SURFACE WATER			T.	0.4460	
		*			SAMP	LE PREPARATION
Color: Odor: REAM Width Depth Velocity FLOW DIRECTION Pools%	Temp pH Ft. Ft. Ft. Ft. Ft. Ft. Ft. Ft	Device Kemmerer Petersen Surber Manual Net Seine Trowl Bucket	Surface Clean Oil Garbage Trash Bubbles Dead Fish Sewage Ind. Waste Float. Solids	Bottom % Ooze Sand Gravel Clay Rubble Rock Shell Organic	Container Glass Jar Plastic Jar Metal Acetate Core Paper Cap Teflon Cap Foil Cap Storage Wet Ice Ambient Dry Ice	Cleaning Procedure Low—High Concentration Detergent Wash Water Rinse Acetone Rinse Hexane Rinse Other Solvent Rinse Specify:

Remarks and Site Description

oil and waterphose.



Environmental Response Team, Environmental Protection Agency Woodbridge Ave., Edison, N.J. 08837 (201) 321-6660

Location:	ROFT SPE	1/05				
Collectors: PK	GP C	W				
	mber (Coneec.#'s) 7333	Date Co	Ollected Pay 8	×16	Time (24 hr)	
SOIL		LAND	,	EGETATION		GROUNDWATER
Device	Soil Type	Upland-Dry	Old Fig	ld Residen	itial	
Auger Core	Rock Gravel	Lowland-Dry Floodplain	Woode Farmia	-	-	epth Ft.
Split Spoon	Sand	Wetland			Sample Depth	
Cylinder Cup Spede	Clay Silt	Gully	Shrube	eous		
Depth	Muck	Slope > 15	Trees		_ % Calor:	
Ft. or in.	Loam Peet Color:	< 15	DBH		In. Odor: Oil: Device:	
	SURFACE WATER					
					SAMF	PLE PREPARATION
Color		Device	Surface	Bottom %	SAMF Container	Cleaning Procedure
Color:	Temp		Surface Clean	Bottom % Ooze	Container Glass Jar	Cleaning Procedure Low—High Concentration
	Temp	Device Kemmerer Petersen Surber	Clean Oil Garbage	Ooze Sand Gravel	Container Glass Jar Plastic Jar Metal	Cleaning Procedure Low—>High Concentration Detergent Wash Water Rinse
Odor.	Temp	Device Kemmerer Petersen Surber Manual	Clean Oil Garbage Trash	Ooze Sand Gravel Clay	Container Glass Jar Plastic Jar Metal Acetate Core	Cleaning Procedure Low—>High Concentration Detergent Wash Water Rinse Acetone Rinse
Odor.	Temp pH Ft.	Device Kemmerer Petersen Surber	Clean Oil Garbage	Ooze Sand Gravel	Container Glass Jar Plastic Jar Metal	Cleaning Procedure Low—>High Concentration Detergent Wash Water Rinse
Odor:	Temp pH Ft.	Device Kemmerer Petersen Surber Manual Net Seine Trowl	Clean Oil Garbage Trash Bubbles Dead Fish Sewage	Ooze Sand Gravel Clay Rubble Rock Shell	Container Glass Jar Plastic Jar Metal Acetate Core Paper Cap	Cleaning Procedure Low—High Concentration Detergent Wash Water Rinse Acetone Rinse Hexane Rinse
Odor:	Temp pH Ft.	Device Kemmerer Petersen Surber Manual Net Seine Trowl Bucket	Clean Oil Garbage Trash Bubbles Dead Fish Sewage Ind. Waste	Ooze Sand Gravel Clay Rubble Rock	Container Glass Jar Plastic Jar Metal Acetate Core Paper Cap Teflon Cap	Cleaning Procedure Low—>High Concentration Detergent Wash Water Rinse Acetone Rinse Hexane Rinse Other Solvent Rinse
Odor:	Temp pH Ft. Ft or In.	Device Kemmerer Petersen Surber Manual Net Seine Trowl Bucket	Clean Oil Garbage Trash Bubbles Dead Fish Sewage	Ooze Sand Gravel Clay Rubble Rock Shell	Container Glass Jar Plastic Jar Metal Acetate Core Paper Cap Teflon Cap Foll Cap Storage Wet Ice	Cleaning Procedure Low—>High Concentration Detergent Wash Water Rinse Acetone Rinse Hexane Rinse Other Solvent Rinse
Odor: STREAM Width Depth Velocity FLOW DIRECTION —	Temp pH Ft. Ft or In.	Device Kemmerer Petersen Surber Manual Net Seine Trowl Bucket	Clean Oil Garbage Trash Bubbles Dead Fish Sewage Ind. Waste	Ooze Sand Gravel Clay Rubble Rock Shell	Container Glass Jar Plastic Jar Metal Acetate Core Paper Cap Teflon Cap Foll Cap Storage	Cleaning Procedure Low—>High Concentration Detergent Wash Water Rinse Acetone Rinse Hexane Rinse Other Solvent Rinse
Odor: STREAM Width Depth Velocity FLOW DIRECTION —	Temp pH Ft. Ft. or In. Ft/Sec Riffles%	Device Kemmerer Petersen Surber Manual Net Seine Trowl Bucket	Clean Oil Garbage Trash Bubbles Dead Fish Sewage Ind. Waste	Ooze Sand Gravel Clay Rubble Rock Shell	Container Glass Jar Plastic Jar Metal Acetate Core Paper Cap Tefion Cap Foil Cap Storage Wet Ice Ambient Dry Ice	Cleaning Procedure Low—>High Concentration Detergent Wash Water Rinse Acetone Rinse Hexane Rinse Other Solvent Rinse Specify:
Odor: STREAM Width Depth Velocity FLOW DIRECTION — Pools — %	Temp pH Ft. Ft. or In. Ft/Sec Riffles%	Device Kemmerer Petersen Surber Manual Net Seine Trowl Bucket	Clean Oil Garbage Trash Bubbles Dead Fish Sewage Ind. Waste	Ooze Sand Gravel Clay Rubble Rock Shell	Container Glass Jar Plastic Jar Metal Acetate Core Paper Cap Teflon Cap Foll Cap Storage Wet Ice Ambient	Cleaning Procedure Low—>High Concentration Detergent Wash Water Rinse Acetone Rinse Hexane Rinse Other Solvent Rinse Specify:

Remarks and Site Description



Environmental Response Team, Environmental Protection Agency Woodbridge Ave., Edison, N.J. 08837 (201) 321-6660

Location:	WECC *	金子				
Collectors:	Pan	PK		3		
	nber (Consec.#'s)	Date C	oilected Day	<u> </u>	Time (24	hr)
No	7332		1/1/18	र्दि		
\$OIL		LAND	٧	EGETATION		GROUNDWATER
Device Auger Core Split Spoon Cylinder Cup Spade Depth Ft.	Soil Type Rock Gravel Sand Clay Siit Muck Loam	Upland-Dry Lowiand-Dry Floodplain Wetland Gully Slope > 15 < 15	Farmian Herbac Shrubs Trees	d Industriand Comme	water Table rotal Sample De	[[] [] []
or in.	Peat Color:		Joan		Device:	MPLE PREPARATION
	SURFACE WATER					
STREAM Width Depth Velocity FLOW DIRECTION —— Pools —— %		Device Kernmerer Petersen Surber Manual Net Seine Trowl Bucket	Clean Oil Garbage Trash Bubbles Dead Fish Sewage Ind. Waste Float. Solids	Bottom % Ooze Sand Gravel Clay Rubble Rock Shell Organic	Container Glass Jar Plastic Jar Metal Acetate Core Paper Cap Teflon Cap Foil Cap Storage Wet Ice Ambient Dry Ice	Cleaning Procedure Low—High Concentration Detergent Wash Water Rinse Acetone Rinse Hexane Rinse Other Solvent Rinse Specify:
TRANSECT INFORMAT		s Direction			Distance Betwee	en Stations
Letter Station #			_ [to	is Ft
Remarks and Site Descri	ption P	A	x1Acy	212		



Environmental Response Team, Environmental Protection Agency Woodbridge Ave., Edison, N.J. 08837 (201) 321-6660

Location: Wi	ELL#4/					8.55
Collectors: C.B.	UKCHETTE,	P. KARM	LZINSK	, F	. HeNALLY	
	331	Date Co		Y' 6	Time (24 hr)	0
SOIL		LAND	V	EGETATION		GROUNDWATER
Device Auger Core Split Spoon Cylinder Cup Spade Depth Ft.	Soil Type Rock Gravel Sand Clay Silt Muck	Upland-Dry Lowland-Dry Floodplain Wetland Guily Slope > 15° < 15°	Shrube	d Industri nd Comme	Water Table De ricial Sample Depth	ppth 284 Ft.
or In.	Peat Color: SURFACE WATER		DBH		In. Oil: Device: DA	LE PREPARATION
						
Odor: STREAM Width Depth Velocity FLOW DIRECTION	Temp pH Ft. Ft. Ft. Ft. or In. Ft/Sec Riffles %	Device Kemmerer Petersen Surber Manual Net Seine Trowl Bucket	Surface Clean Oil Garbage Trash Bubbles Dead Fish Sewage Ind. Waste Float. Solids	Bottom % Ooze Sand Gravel Clay Rubble Rock Shell Organic	Container Glass Jar Plastic Jar Metal Acetate Core Paper Cap Teflon Cap Foil Cap Storage Wet Ice Ambient Dry Ice	Cleaning Procedure Low—High Concentration Detergent Wash Water Rinse Acetone Rinse Hexane Rinse Other Solvent Rinse Specify:
TRANSECT INFORMATI	Compe	s Direction		•	Distance Between St	tations
					to	is Ft

Remarks and Site Description

P.P. VOA ANALYSIS

- WELL BALLED - WOULD NOT RECHARGE

ENVIRESPONSE, INC.

CHAIN OF CUSTODY RECORD

PROJECT NAME GRASS MEXE

PROJECT NO.

SAMPLE SAMPLING DATE SAMPLE TYPE & O VOLUME NO. OF COLLECTION & C

SAMPLE DENTFICATION	SAMPLING LOCATION	DATE SAMPLED		PLE TY	PE OIL	COMP	GRAB	VOLUME TO BE COLLECTED	NO OF CONTAINERS	TIME COLLECTION BEGAN	INITIAL	TIME COLLECTION COMPLETED	INITIAL	COMMENTS
734/	SSLN # 1 BR	9-12	V				~	14	/	0000	PA	1700	PA	PP METALS
734/	14	7-12	4				-	250 ml	/	080	22	1700 B	S Lu	AL, FE, MA
7342	Legon	9-12				_	1	16	1	Alog !	2	1 rode	A	PP METACS
7342	. 11	9-12	1				1	250 m		asud	Zja	(sol	I K	AL, FE, MN
7344	Highue, Draw	9-12	0					14	/	0800	14	700	2	PP HEMES
7344	11	9-2	1		_			worl		080	14	day	IH.	AL, FE, MN
7345	SitePrin	9-12	V					14		aren'	1	1704	M	CP METALS.
7345	l i	9-12	V	_				75D ml	1	OSN)	Qu.		My.	AL, FE, MN
					_					/		,		
				1	 	_	_							
				_	_		_	7						
	-		Ш											
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														·
LINQUISHED BY:			_ DATE /						ED BY: NAM	E				DATE/TIME

							
RELINQUISHED BY:	NAME	DATE/TIME		RECEIVED BY: NAM	Æ		. DATE/TH
RELINQUISHED BY:	NAME	DATE/TIME		RECEIVED BY: NAM	£		 . DATE/TII
RELINQUISHED BY:	NAME	DATE/TIME		RECEIVED BY: NAM	Æ		 . DATE/TI
AUTHORIZATION FO	OR DISPOSAL	DATE/TIME .		DISPOSED BY:			 . DATE/TE

Ü

APPENDIX D

MONITORING WELL INSTALLATION DETAILS



NAME: Saad Was + NOB NUMBER: LOGGED Mc Wolly WELL NAME: M W - 11	PROJECT			LOCKING STEEL COVER
NAME: Saad \A/Ost NUMBER: LOGGED Me Wolly				
Me Wally	MANAGER:	armozinki	41-7-7	STEEL CONDUCTOR CASING
WELL	EDITED Karn	47MU 2.77.18		1.34 10 2.16 leet
1 - 11 W - 11	Jan. Karn	DATE:		BOREHOLE
PILLING		3/36/8/		0.3 to 173 feet
QUIPMENT: //		DRILLER:	11 1	BENTONITE CEMENT
	LLOW STEM AUGER	HOURS		SEAL OR BISACK CEMENT SAND
INCH RO	TARY WASH	DRILLED:	11 1 1	SEAL O.O to 2.5 leet
SED DURING DRILLING:		GALLONS		
RIOR TO DRILLING:	Prescurize	d Steam	[] [1.84 FEET ABOVE
DEVELOPMENT				BELOW GROUND LEVEL
DEVELOPMENT: SUFFE	- Pumping)	11.1	BOREHOLE
DEVELOPMENT 3/25/87	TIME: 1/0	DATE:		0.0 to 17'9" feet
GPM FROM	то	DATE:		SCHEDULE 40 PVC
GPM FROM	то			BLANK CASING
GPM FROM	то	DATE:		BENTONITE CEMENT
GPM FROM	то	DATE:		SEAL OR B SACK CEMENT SAND
TOTAL WATER REMOVED DURING DEVELOPMENT:		GALLONS		SEAL 0.5 10 2.5 feet
DESCRIPTION OF TURBIDITY OF TUR	_	IGHTLY CLOUDY		BENTONITE PELLET SEAL 2.5 104.5 feet
DOR OF				S e = S . e
NATER: Organ. C	RFACE TANK	TRUCK		SANDFACK
ro: □STORM SEWI	ERS □STORA □ OTHEF	GE TANK		4.5 10 3.2 1eet 4 INCH DIAMETER
DEPTH TO WATER AFTER DEVELOPMENT: 8, 49 1		FEET		SLOTTED : 0.030
MATERIALS USED	3610W G3			4.32 to 16.32 feet
	(()			- INCH DIAMETER
SACKS OF Gro				SCHEDULE 40 PVC BLANK SILT TRAP
GALLONS OF GROUT	USED			BOTTOM WELL CAP
SACKS OF POWDERE	DBENTONITE			16.32(leet
20 POUNDS OF BENTONI				HOLE CLEANED OUT TO
FEET OF 4 INCH F				BOT TOM OF BOREHOLE
YARO ³ CEMENT-SAND	D (REDI-MIX) ORDE	RED	NOT TO S	CALE
YARD3 CEMENT-SANG	D (REDI-MIX) USED		ADDITIO	NAL INFORMATION:
CONCRETE PUMPER USED?	NO TYES			
NAME			***	
WELL COVER USED: STLOCKING				



FIELD WELL	COMPLETION	FORM						_ 0	CHRISTY BOX
JOB ()	1. 1. 1. 1	~ · /			П			กไଷ	LOCKING STEEL COVER
NAME: Saa J	1 Waste (TPROJECT			· Ч,		7_	世	STEEL CONDUCTOR
NUMBER:		EDITED		Britaki	.				CASING 132 feet
LOGGED Mc Wa	clly	SA:		azirs c					LO INCH DIAMETER
MAME: M	v -14		DAT	3/26/87	. [1				BOREHOLE
DRILLING COMPANY:	es Tel								00 to 20.01eet
EQUIPMENT:	LY INCH HOL	LOW STEM	AUGER DRI	LLER:				├ ─⊠	BENTONITE-CEMENT
0_		ARY WASH	ноч	JRS LLED:		1		- -	8 SACK CEMENT SAND SEAL
GALLONS OF WAT				LONS	•				to feet
METHOD OF DECO	MOITAMINATION					~	74		TOP OF CASING AT
DEVELOPMENT	· · · · · · · · · · · · · · · · · · ·	· / · K t d	1 5700	<u>~</u>	· 1			1	1. LEFEET ABOVE AT
METHOD OF		<u></u>			•				BELOW GROUND LEVEL 10 INCH DIAMETER
DEVELOPMENT:	Surfa		❤						BOREHOLE
BEGAN DATE:	3/26/67	TIME: /	1500 1841						(1.0 to (10) Of eet
GPM	FROM	то			. }		 	 	SCHEDULE 40 PVC
GPM GPM	TIME: FROM	то	DAT						BLANK CASING
YIELD: GPM	TIME: FROM	то	DAT	re:					
YIELD: GPM	TIME:	то	DAT	řĒ:		j		l .	BENTONITE CEMENT SEAL OR BSACK CEMENT SAND
TOTAL WATER RE	MOVED	-	GAL	LONS	•				SEAL _
DESCRIPTION OF TURBIDITY	CLEAR	·		LY CLOUDY	-	888	 	3	<u> </u>
AT END OF DEVELOPMENT:	MOD. TU	081D	☐ VERY N						BENTONITE PELLET SEAL
ODOR OF	_		U VERT N				<u>:::::::::::::::::::::::::::::::::::::</u>	4	0 0 1. 11 'eet
WATER:	S Ganic		1	•••		<u> </u> _	-¦ ►	 	SAND PACK
DISCHARGED TO:	☐ GROUND SUR		TANK TRUC STORAGE T			ΙΞ	=; =;		1 1/10/9-11 teet
	DRUMS		OTHER				_	—	4_ INCH DIAMETER
DEPTH TO WATER	WENT: 2.316	Bolow G	S FEET	T	.		=:		SLOTTED : 0.035
MATERIALS US						ίΞ	_ _,	ĺ	1.11 .0 /7 11 inet
		/ c	1/ 6		•		-	 	INCH DIAMETER
SACK	(S OF	1	,1,05	SAND					BLANK SILT TRAP
				CEMENT					tofeet
_	LONS OF GROUT		-			<u> </u>)-	-	BOTTOM WELL CAP
	S OF POWDERED								
	NDS OF BENTONIT								HOLE CLEANED OUT TO
257 FEET	OFINCH P				1			_	BOTTOM OF BOREHOLE
FEE I	OF INCH P	VC SLOTTE	D SCREEN						&O.D feet
VADO	O ³ CEMENT-SAND	******************************			,	NOT TO	SCA	ıF	
	D CEMENT-SAND								
						ADDIT	IONA	LINFO	PRMATION:
CONCRETE PUMPE	,	10 YE	S		•	 -			
WELL COVER USE		TEEL COV		···	٠ .				- · · · · · · · · · · · · · · · · · · ·
MELL GOVEN USE	D: MECCENNES		ER						
	OTHER								



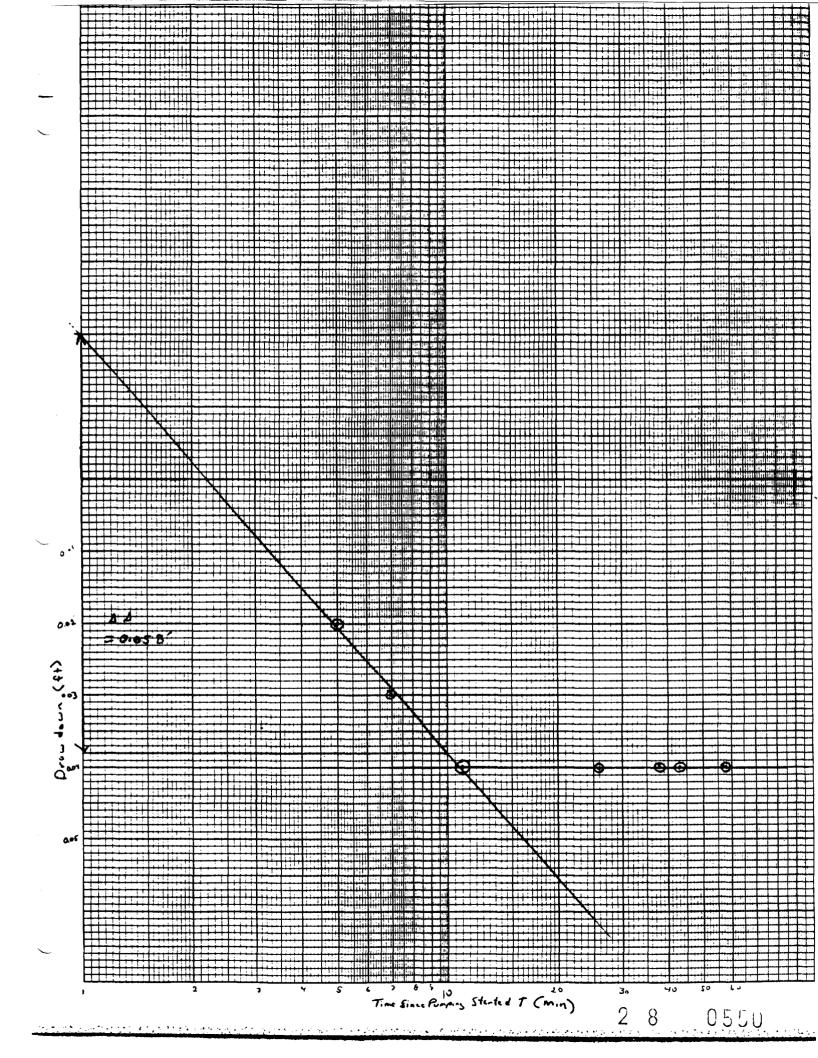
FIELD WELL CO	MPLETION FORM			CHRISTY BOX
	1110	/	The state of the s	D LOCKING STEEL COVER
AME: SGGC DB UMBER:	Waste O	GER: Karmazinski	4	6 INCH DIAMETER STEEL CONDUCTOR CASING
OGGED M. No	II.			tofeet
ELL ///	11 11 11 11 11 11 11 11	DATE:/24/87		10 INCH DIAMETER
RILLING		3/8//		tofeet
OLLIEMENT:	colek	DRILLER:		BENTONITE CEMENT
	INCH HOLLOW ST	HOURS		SEAL OR 8 SACK CEMENT SAND SEAL
ALLONS OF WATER	<u> </u>			tofeet
SED DURING DRIL	TAMINATION	GALLONS		TOP OF CASING AT
RIOR TO DRILLING	Frassur	erd Strom	.]]	1.90 FEET ABOVE
EVELOPMENT			.	BELOW GROUND LEVE
EVELOPMENT:	surface Pur	<u> 1819</u>	.	BOREHOLE
EVELOPMENT	3/24/37 TIME:	14 as	.	<u>රාට :0 පි. දි feet</u>
GPM F	ROM TO	DATE:	.	SCHEDULE 40 PVC
GPM F	ROM TO	DATE:	. !!!	BLANK CASING
GPM F	ROM TO	DATE		M BENTONITE CEMENT
	ROM TO	DATE:	. •	SEAL OR B SACK CEMENT SAND
OTAL WATER REM URING DEVELOPM		GALLONS	.	SEAL 0.0 % 1.5 feet
ESCRIPTION F TURBIDITY T END OF	CLEAR	SLIGHTLY CLOUDY		BENTONITE PELLET
EVELOPMENT:	MOD. TURBID	VERY MUDDY	. 🕮 🎘	1.5 .0 2.5 ·een
	reanis		. - •	Silico Grace
HISCHARGED	ZGROUND SURFACE ISTORM SEWERS	☐ TANK TRUCK ☐ STORAGE TANK		SAND PACK S. 510 7.82 feet
	DRUMS	OTHER	. =	1 NCH DIAMETE
EPTH TO WATER FTER DEVELOPME	INT: 8,03/60.	S FEET		SLOTTED : 0.020
ATERIALS USE)			9. 17.0 7.8 Fines
4 SACKS	OF	Silice samo		SCHEDULE 40 PVC
	^	CEMEN1	.	BLANK SILT TRAP
	NS OF GROUT USED			BOTTOM WELL CAP
	OF POWDERED BENTO	NITE		7.83 teet
	S OF BENTONITE PELL			HOLE CLEANED OUT
	F 2 // INCH PVC BLA			8.5 feet
5 FEET O	F 2" INCH PVC SLOT	TTED SCREEN	<u> </u>	B. 5 feet
YARO ³	CEMENT-SAND (REDI-A	MIX) ORDERED	NOT TO SCA	ALE
YARD ³	CEMENT-SAND (REDI-	MIX) USED	ADDITIONA	AL INFORMATION:
CONCRETE PUMPER	USED? MO	YES	-	
NAME		· · · · · · · · · · · · · · · · · · ·	-	
NELL COVER USED:	☐ LOCKING STEEL C			
	LI UI AER		·	

APPENDIX E

SINGLE WELL PUMPING TEST

				Ì	1 ·
					<u> </u>
			55	49000	81:0
		50,0	28	* 54. r	81:0
		J U	811	C.25 61A	80:
	i	50.0	ξħ	7.43.	(5)
		50.0	38	,84.1	:23
		_	38	44959	94.
		20.0	36	184.7	Oh
		•	61	CEPA	58
		0.02	b/ %/	, Eh. L	98.
			01	M20.0	+ E
		003	L 2	"IH.C	15
		So.0	5	,Oh'L	6
			O 006 Ly	6.5 GPM	,
			0		4237 4
				138,	,4-2
		(+3)	Proping Startes	Shiamug	* 2
400 B 30 A		<i>لاد ب</i> راهب	mis + smit	υ• Δ (45)	1.043

* Account from top at temporary DVC hose instelled in DVC Server



Where

00h'78

= 190-COW/t+99

- 6 25-(BOR)

Specific Coperil = Dade

2 8 0552

APPENDIX F

PRIOR GROUNDWATER ANALYSIS

NUS FIT Report, Sampling Investigation Report Saad Site, Nashville, Tennessee, September 9, 1983

Table I Saad Site Nashville, Tennessee

SAMPLE CODES, DESCRIPTIONS AND LOCATIONS

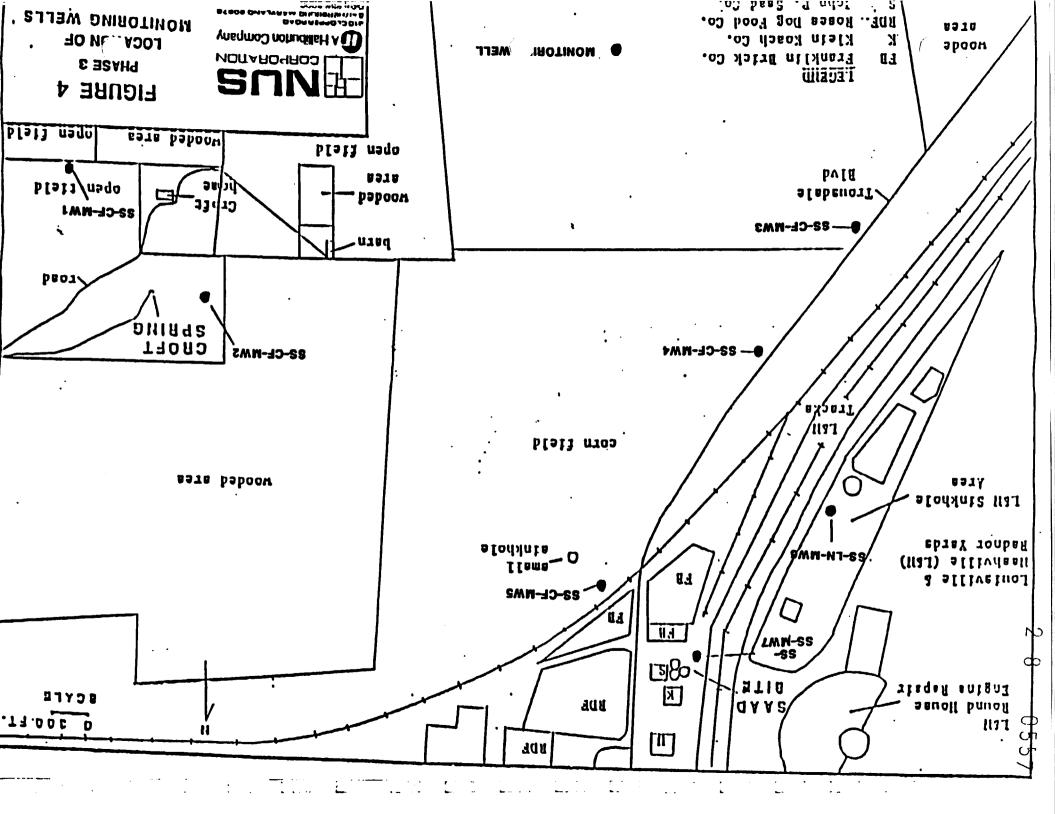
CODE	DESCRIPTION	LOCATION
	DILLET	₹.
	PHASE	<u>ı.</u>
SS-PW-IW	Water	Newman's Private Well
SS-PW-2W	Water	Lankford's Private Well
SS-FB-W	Water	Behind Franklin Brick
SS-LN-DL-W	Water	Secondary Drainage Lagoon Radnor Railroad Yard
SS-LN-DL-S	Sediment	Secondary Drainage Lagoon Ragnor Railroad Yard
SS-LN-OS-W-	Water	Qil Separator Radnor Railroad Yard
SS-LN-OS-S	Sediment	Oil Separator Radnor Railroad Yard
SS-CON-1S	Soil	18" below surface behind Saad Oil Company
SS-CON-2S	Soil	6' below surface behind Saad Oil Company
SS-S-6.1-W	Water	Ground seepage near big spring on Croft farm
SS-S-6.1-S	Sediment	Ground seepage near big spring on Croft farm
SS-Ş-2-W	Water	Side spring near spring S-2 on Croft farm
SS-S-2-S	Sediment	Side spring near spring S-2 on Croft farm
SS-S-3.1-W	Water	Second spring on Croft farm
SS-S-3.1-S	Sediment	Second spring on Croft farm
SS-SP4-5-W	Water	Side stream near spring on Croft farm
SS-SS-SP4-5S	Sediment	Side stream near spring on Croft farm

TABLE 1 (continued)

CODE	DESCRIPTION	LOCATION
SS-T-2-W	Water	Industrial creek north of Croft farm*
SS-T-2-S	Sediment	Industrial creek north of Croft farm*
SS-BC-W	Water	Below confluence of Croft spring and industrial creek*
SS-BC-S	Sediment	Below confluence of Croft spring and industrial creek*
SS-S-7-W	Water	Major spring on Croft farm (Croft spring)
SS-S-7-S	Sediment	Major spring on Croft farm (Croft spring)
SS-CF-SP*	Water	Major spring on Croft farm (Croft spring)
	PHASE II:	2
SS-CS-1	Composite Soil	Intersection of Vulcan & McNalley Drive, north of railroad track
SS-CS-2	Composite Soil	Intersection of Vulcan & McNalley Drive, south of railroad track
SS-CS-3	Composite Soil	Low point east of Trousdale Blvd. at SW corner of Kabinart Corporation
SS-CS-3A	Composite Soil	Drainage ditch west of Trousdale Blvd. across from SS-CS-3
SS-CS-4	Composite Soil	Sink hole across Trousdale Blvd. from Saad site
SS-CS-5S	Sediment	Low point behind fenced area across from Saad Oil Company
SS-CS-5W	Water	Low point behind fenced area across from Saad Oil Company

TABLE I (continued)

CODE	DESCRIPTION	LOCATION						
SS-CS-6	Composite Soil	Drainage ditch on Croft Farm at corner of railroad track Trousdale Road						
SS-CS-7	Composite Soil	Drainage ditch on eastern side of Trousdate Road at culvert mouth						
SS-CS-8W	Water	Ditch west of Trousdale Road south of Saad site						
SS-CS-8S	Sediment	Ditob west of Trousdale Road south of Saad site						
	PHASE III (Figure	v /						
SS-WT-1	Water	Tank truck used by driller						
SS-CF-MW2	Water	Monitoring well No. 2 on Croft Farm						
SS-CF-MW3	Water	Monitoring well No. 3 on Croft Farm						
SS-CF-MW4	Water	Monitoring well No. 4 on Croft Farm						
SS-CF-MW5	Water	Monitoring well No. 5 on Croft Farm						
SS-LN-MW6	Water	Monitoring well on L&N property						
SS-SS-MW7	Water	Monitoring well on Saad property						
* Sample actually takes collected from the sp	during Phase III but is incoring in Phase I.	luded with the other samples						



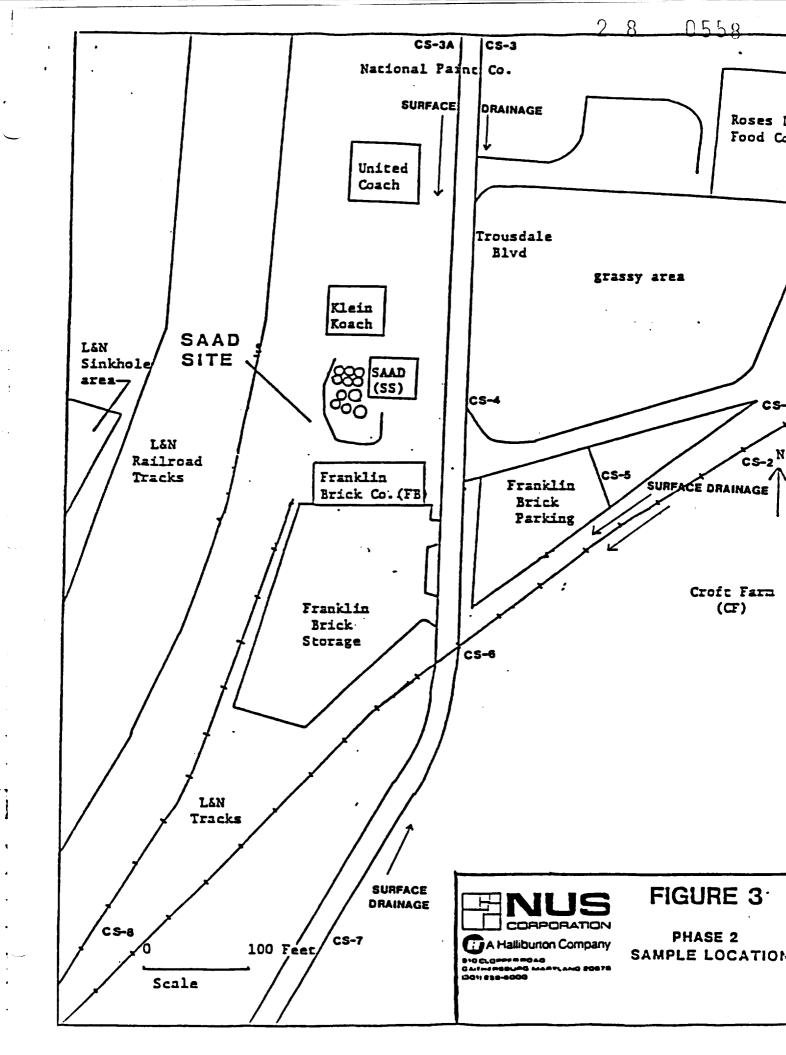


Table II
Saad Site - Phase I
Water Samples
Inorganic Analysis
(in ug/l)

						(111 06/17							
Element	SS- PW-IW	SS- P W-2W	SS-W	SS-	SS- LN-OS/W	SS- CF-SP	SS- S-7/₩	SS- S-6.1/₩	SS- S-2/₩	SS- S-3.1/₩	SS- SP4-5/W	SS- T-2/W	SS- BC/W
Barium Cadmium*	-	-/	380))21	\ :	3	-	121	14	•	-	-	-
Copper* Lead*	5	17	22	38	\bigcirc :	22	- -	- -	-	<u>-</u>	<u>-</u>	-	<u> </u>
Strontium Titanium	341 3	144 10	530 230	113	778	/- /	160	104 278	140 21	85 -	. 91 10	171	163 10
Vanadium Yttrium	- -	-	33 17	-	·~	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	\	Na II	>. [:]	-	<u>-</u>	-	-
Zinc* Aluminum	22 130	267 400	95 39,000	78 500	100	\frac{1}{2}	1,000	11,000	580	\ :	500	200	10 200
Manganese Calcium	10 54,000	46 70,000	1,400 250,000	77 36,000	2,200 96,000	3,200	2,400 90,000	1,400	920 84,000	61,000	72,000	72 99,000	170 N 92000 C
Magnesium Iron	10,000 900	6,600 300	26,000 22,000	5,400 900	9,700 700	5,300	6,500 26,000	6,600 12,000	6,200 1,000	-4,900 -	5,000 200	6,600 100	6200 200 ⊂
Sodium Cyanide*	4,500 <2	9,000 <2	19,000	12,000	31,000 10	-	11,000	12,000 <2	9,000 <2	4,000 <2	10,000	10,000 <2	9000

- Material was analyzed for but not detected

Table III
Saad Site - Phase I

0560

Table III (continued) Saad Site - Phase I Water Samples **Purgeable Organic Analysis** (in ug/1) SS- SS-CF-SP S-7/▼ SS-S-6.1/W(3) SS-S-2/W SS-S-3.1/W SP4/5/W(i) SS-T-2/W SS-SS-BC/W PW-IW PW-ZW Compound total unidentified alkylhydrocarbons **30 JN** methyl isobutyl ketone 43 Vinyl Chloride* (1) For station SP4-5/W, acid preserved sample was lost dunig analysis. No acid preserved sample. (2) (3) Holding time exceeded. Estimated value. Ν Presumptive evidence of presence of material. compound not analyzed for. Priority pollutant.

---0.561

Table IV
Saad Site - Phase I
Water Samples
Extractable Organic Analysis
(in ug/l)

		•										• •	
Compound	PW-1W	PW-2V	FB-W	TH-DL/A	LN-OS/W	CF-SP(I)	S-7/W	S-6.1/W	5-2/W	S-3.1/W	SP4/5/W	T-2/W	BC/W
Acenaphthene*	•	-	(1.03	1-/	_	•	•	-	-	•	-	-	-
Flouranthene*			1203	//-	<u> </u>				•	_	-	-	
Pyrene*	-	-	1.01	/ ₋ <) }	-	-	-	•	-	-	-	-
Chyrsene*	_		<	53	<u> </u>	<u> </u>	•			<u>.</u>		•	
Benzo(6HI)Perylene*	-	-	-	14,2) /	7-	•	-	1.0 3	-	-	•	-
2,4-Dimethylphenol*	-	-	3.8 J		<u> </u>		<u>\ -</u>				-	_	
Pentachlorophenol*	•	-	•	84 J	/~`\	/ -/	, <u>,</u>	-	1.0 3	-		-	-
Naphthaleneamine (3 isomers)	•	<u>-</u>	. 25 JN	-	- <	//- ~		· ·	-	-	-	-	-
C3Alkylbenzenesulfo- Namide	•	•	10 JN		-		V.	> ->	> 1.0 3	•	•	•	•
Phosphoric acid, tributyl ether	•	-	10 JN	-	•	-	-/	/.~	-	-	-	•	•
C5Alkylbenzenesulfo- namide	•	•	10 JN	•		-		-	1.0 J	-	•	-	- ^
Hexadecanoic Acid	_•		10 JN		<u>-</u>		10 JN			10 JN	<u>-</u>		-
Methylphenal	-	-	10 JN	•	-	-	_	-	1.0 J	•	•	•	<u>-</u>

Table IV (continued) Saad Site - Phase I Water Samples Extractable Organic Analysis (in ug/l)

Compound	PW-1W	₽₩- 2₩	PB-W	LN-DL/W	LN-OS/W	CF-SP(1)	S-7/₩	S-6.1/₩	\$-2/ ₩	S-3.1/₩	SP4/5/W	T-2/₩	BC/T
Methyldibenzothiophene	<u> </u>	-/	<i>-</i>) - ^	20 JN					<u></u>		<u>- i i i i i i i i i i i i i i i i i i i</u>	
Methylphenanthrene					NC OF							<u>-</u>	
C ₂ alkylphenanthrene (4 isomers)	•	-		//- <	NE OF	-	-	-	•	•	-	•	-
C ₂ Alkylphenanthrene (4 isomers)	•	-		\ -\)	NE OT		-	•	-	-	-	-	-
Methylpyrene	-	•	•	- <	NE OL	1 /-	<u> </u>	-	•	-	-	-	-
Bromoethylmethylpropyl-		-	-		<u>\\</u>	- /	10 24	-			, <u></u>	<u> </u>	
Dimethylbenzenesulfonamide	•	-	, -	•	- \			>	10 JN	•	•	•	-
Petroleum Type Product		_		-	NQ	V	` > ^.	(-\	-	•	-	<u> - </u>	
Unidentified Compounds ⁽²⁾	-	•	2	•	•	Ţ	<u> </u>	>-^	> -	ı	1	•	•
- Material was analyzed for b J Estimated value. N Presumptive evidence of re							<		/				

NQ Material not quantified.

(2) For station CF-SP, quantity for phenals is suspect based on QC data.

(2) Recorded in number of compounds detected not ug/l.

* Prioity pollutant.

 ∞

Table IV (continued) Saad Site - Phase I Water Samples Extractable Organic Analysis (in ug/l)

			/ \			44)						٠	
Compound	ba-ia	P▼-2▼/	FB/K	TV-DL/A	LN-OS/W	CF-SP(I)	S-7/W	S-6.1/W	S-2/₩	5-3.1/₩	SP4/5/W	T-2/W	BC/W
C3Alkylnaphthalene (2 isomers)	•		(-)) 5) 3b^		-	-	-	-	•	-	-	•
Dibenzothiophene			<u> </u>	/NE 08	77								
Methyldibenzothiophene (2 isomers)	-	-	•	NB 05		_	-	-	-	-	-	-	-
C ₂ Alkylnaphthothiophene (2 isomers)	•	-		50 JH)//	<u> </u>			-	•	•	-	-
C ₂ Alkylphenanthrene	•	•	-	50 JN		7-/	1	=	1.0 J	•		-	-
Tetrahydromethylnaphthalen (2 isomers)	-	-	<u>-</u>	-	15 JN		$\langle \cdot \rangle$	<u>, </u>	-	<u> </u>	-	-	-
C ₂ Alkylnaphthalene (2 isomers)	-	-	-	-	10 JN	' \-\^	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	> -\	1.0 3	-	-	-	-
Octahydrohexamethyl- lindene	-	.	-	-	21 JN	•	- /	$^{\prime}$	/ -	-	•	•	•
C ₃ Alkyinaphthalene (7 isomers)	•		•	-	50 JN	-	-<	-	L Q.I	•	-	-	•
C _{&} Alkyinaphthalene (5 isomers)	•		•	•	150 JN	*		- ,		-	•		
C ₂ Alkylbiphenyl	•	•	•	-	10 JN	-	-	-	1.0 J	-	-	-	- ∞

Table V
Saad Site - Phase I
Soil/Sediment Samples
Inorganic Analysis
(in ug/kg)(1)

Element	SS- LN-D4S	SS- LN-05/5	55 CON-15	SD- CON-25	55- 5-X5	SS- S-6.1/S	SS- S-2/S	SS- S-3.1/S	SS- SP4-5/S	SS- T-2/S	SS- BC/S	SS- CF-SP
Silver*	-	-	8,400		(j)	<u></u>	•	-	-	<u>-</u>	-	1,700
Arsenic*	-	-	-	-> ()	<u> </u>	-	-	-	•	-	1,500
Barium	56,000	100,000	250,000	240,000	2501000	220,000	330,090	190,000	90,000	130,600	130,000	35,000
Cadmium*	1,000	-	31,000	-	-	<i>J</i> /.) 	-	-	-	1,000
						-	\\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\	>				
Cobalt Chromium*	10,000	25,000	180,000	- 34,000	30,000	20,000	NA 26,000	18,000	15,000	NA 11,000	NA 15,000	5,500 8,800
Copper*	24,000	69,000	170,000	26,000	17,000	7,600	5,000	6,000	4,400	5,000	13,000	-
Nickel*	4,600	10,000	96,000	20,000	-	12,000	12,000	9,000	8,000	7,000	6,500	8,900
Lead*	26,000	82,000	410,000	100,000	-	21,000	16,000	15,000	9,000	46,000	140,000	2,200
Tin	-	-	40,0003	-	-	-	-	-	-	-	-	-

Table V (continued) Saad Site - Phase I Soil/Sediment Samples Inorganic Analysis (in ug/kg)(1) SS-SS-SS-SS-SS-SS-55-SS-SS-LN-OS/S CON S-6.1/S S-2/S BC/S LN-D4S CON-13 S-3.1/S SP4-5/S T-2/S Element CF-SP 150,000 230,000 370,000 140,000 280,000 Strontium 62,000 290,000 310,000 100,000 330,000 NA Tellurium *5*€€0,000 120,000 180,000 130,000 Titanium 64,000 140,000 74,000 140,000 120,000 NA 860,000 150,000 31,000 800 Dec 2000 59.000 22,000 12,000 Zinc* 70,000 69,000 22,000 58,000 NA 190 120 229 250 Mercury* NAI NA 110,000 Thailium * N 2,000,000_{CO} 14,000,000 19,000,000 19,000,000 20,000,000 15,000,000 9,900,000 12,000,000 3,500,000 9,400,000 9,800,000 19,000,000 Alumium 7,200,000 2,000,000 1,800,000 5,600,000 840,000 1,200,000 5,500,000 640,000 5,100,000 780,000 170,000 680,000 Manganese

Table V (continued)
Saad Site - Phase I
Soil/Sediment Samples
Inorganic Analysis
(in ug/kg)(1)

Element	SS- LN-D4S	SS- LN-OS/S	25- CON-15	SS- CON-25	\$5-7/5	55- 5-6.1/5	SS- S-2/S	SS- S-3.1/S	\$\$- \$P\$-5/\$	SS- T-2/S	SS- BC/S	SS- CF-SP
Iron Sodium	8,400,000	22,000,000	18,000,000	25,000,000	8,00 0,0 00 1,109,000		32,000,000 490,000	18,000,000	14,000,000	17,000,000		10,000,000
Sodium	230,000	<i>55</i> 0,000	680,000	430,000	1,100,000	1	490,000	880,000	370,000	490,000	590,000	NA
Cyanide*	200	200	-	-	200	200/	200	200	200	200	200	-
- Material	was analyzed fo	or but not dete	cted.			\	•	/ \	.			
NA Elemen	t not analyzed i	ior.					_	/ /\/	•			
J Estimate	d value.											
NAI Interfe	rences							/				

* Priority

Actual value is known to be less than value given.

(I) Dry Weight

2

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0567

Saad Site - Phase I Soil/Sediment Samples **Purgeable Organic Analysis** (in ug/kg)(3)SS-SS-SS-SS-**SS-**SS-SS-Compound LN-DL/S CON-25 S-7/S S-6.1/S S-3.1/S SP4-5S BC/S **S-2/S** T-2/S CF-SP 1,1-Dichloroethane* 3J 290 **4**J 3,0002 1,1,1-Trichloroethane* 450 65,000 2,0003) Trichloroethene 4J 14,000 33 3J **4**J Tetrachloroethene 16,000 Toluene* 78 270,000 Ethyl Benzene* 130 NA NM-Xylene 310 170,000 4,000J O & P-Xylene (mixed) 120,000 4,0003 260 ರು

Table VI

Table VI (continued) Saad Site - Phase I Soil/Sediment Samples **Purgeable Organic Analysis** (in ug/kg)(3)SS-SS-55-SS-SS-SS-SS-SS-LN-DL/S **CON-25** S-6.1/S S-7/S S-3.1/S 5-2/5 SP4-5S T-2/S BC/S CF-SP Compound Isopropanoi 10JN Methylethyl Ketone 500JN Methyl Isopropyl Ketone **30JN** Methyl Butyl Ketone **30JN** Methyl Isobutyl Ketone 300JN Total Unidentified Alkyl 1,1003 Hydrocarbons 1,700,0003 180,0003 6,800J 1,0003 50J Unidentified Terpene **30**J <u>.</u> ෆ Tricyclodecane

Table VI (continued) Saad Site - Phase I Soil/Sediment Samples **Purgeable Organic Analysis** (in ug/kg)(3)SS-55-SS-SS-SS-LN-DL/S **GON-25** S-7/S 5-6.1/5 **S-2/S** 5-3.1/5 BC/S Compound SP4-5S T-2/S CF-SP Trimethylcyclohexane Unidentified Compounds Methylene Chloride 250,000 Trans-1,2-Dichloroethene 13,000 12,000 180,000JN 18,000JN Isooctanol 37,0003 14,0003 C₉Alcohol (isomer unknown)

Table VI (continued) Saad Site - Phase I Soil/Sediment Samples Purgeable Organic Analysis $(in ug/kg)^{(3)}$ SS-SS-SS-SS-SS-SS-CON-25 LN-DL/S **S-7/S** S-6.1/S S-2/S S-3.1/S SP4-5S Compound T-2/S BC/S CF-SP 22.000JN Decanol * Priority pollutants. - Material was analyzed for but not detected. J Estimated value. N Presumptive evidence of presence of material NA Compound not analyzed for. (1) Unidentified compounds recorded as number of compounds detected, ug/kg. (2) The data is suspect based on quality control information. (3) Dry weight.

N

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Table VII
Saad Site - Phase I
Soil/Sediment Samples
Extractable Organic Analysis

(in ug/kg)(1)											
Compound	SS- LN-DL/S	SS- LN-OS/S	SS- COM-15	SS- CON-25	SS- S-7/S	SS- S-6.1/S	SS- S-3.1/S	SS- SP4/5S	SS- T-2/S	SS- BC/S	SS- CF-SP
			// (5	· · · · · · · · · · · · · · · · · · ·						
Naphthalene*	5,400J	2,0003	/ -^	\(\)	-	-	-	-	-	-	-
Acenaphthene*	+,6003	-	\checkmark)	/	\frown	•	•	-	1,4003	-	•
	· · · · · · · · · · · · · · · · · · ·			1/ /	1	$\overline{\wedge}$	·				
Flourene*	12,0003	4,5003	-	\	` <i> - /</i>	` `	•	-	1,4003	-	-
Phenanthrene*	36,0003	[8,000]	•	-]	\\ \\ \\ \\ .		<u> </u>	-	2,5003	-	•
			<u>.</u>		\mathbf{Y}	\rightarrow	7				
Anthracene	-	2,0003	-	-	•	- /	′ _~ - >	-	1,400J	-	-
Flouranthene*	♦ ,600 J	3, 4 00J	-	-	-	-/		-	1,300J	-	•
						$\overline{}$,				······································
Pyrene*	7,5003	9,0003	-	· •	-	-	-	-	3,900J	•	-
Benzo(A)Anthracene*	-	2,000J	-	-	-	-	• -	-	1,4003	-	-

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Table VII (continued)
Saad Site - Phase I

Soil/Sediment Samples
Extractable Organic Analysis
(in ug/kg)(1)

Compound	SS- LN-DL/S	SS- LN-OS/S	SS) CON-1/S	55- CQN-25	\$\$- \$-7/\$	SS- S-6.1/S	SS- S-3.1/S	SS- SP4/5S	SS- T-2/S	SS- BC/S	SS- CF-SP
				$\overline{}$							
Chrysene*	4,6003	2,0003	- /-^	\cup_{\perp}	_ -	-	-	-	1,4003	_	•
Benzo(B)Flouranthene	-	2,0003	~)	5-/		-	-	-	1,400J	-	-
						$\overline{\ }$					
Benzo(K)Flouranthene*	-	2,000J	-	~ /	- - /	~ · /	-	-	1,4003	-	-
Benzo-A-Pyrene*	-		-	- (J/,		\sim	-	1,4003	-	-
			- · <u>· · · · · · · · · · · · · · · · · ·</u>				7				
Benzo(GHI)Perylene*	•	•	-	-	-	- /	/ _~ >	-	2,5003	-	-
Pentachlorophenoi*	-	-	•	-	•	2,7000	5203	-	<u>-</u>	-	-
							/				
C ₂ Alkylstyrene	46,000JN	•	-	-	-	-	•	-	-	-	-
C ₃ Alkylstyrene											
(3 isomers)	46,000JN	-	-	-	-	-	•	-	-	-	-

Table VII (continued)
Saad Site - Phase I
Soil/Sediment Samples
Extractable Organic Analysis
(in ug/kg)(1)

Compound	SS- LN-DL/S	\$5- 1.N-05(5	SS CON IS	55- EQN-25	SS- S-7/S	SS- S-6.1/5	SS- S-3.1/S	SS- SP4/5S	SS- T-2/S	SS- BC/S	SS- CF-SP
C ₂ Alkylflourene	50 000311			0)							
(4 isomers) Dibenzothiophene	NE000,08 NE000,09	-	. \)-/		-	•	-	-	•	-
Mashulaharasahuan	<u> </u>		 		1/				•		
Methylphenanthrene (3 isomers)	70,000JN		-	- '	\J-/ ,		·\	-	-	-	•
C ₂ alkylphenanthrene (5 isomers)	50,000JN	26,000JN	-	•		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	$\langle \dot{\gamma} \rangle$	-	-	-	-
Co A Hambaranthana	46,000JN			_		7					
C3Alkyphenanthrene Dimethylnaphthothiophene	750,000 N	-	-	- -	- 59,000JN	- ~	-	-	-	-	
C _b Alkylbenzene	-	20,000JN		-	-	-	-	-	-	<u>-</u>	- (

Table VII (continued)

Saad Site - Phase I

Soil/Sediment Samples

Extractable Organic Analysis

(in ug/kg)(1)

SS- SS- SS- SS- SS-

Compound	SS- LN-DL/S	\$5- N-05/5	55- CON-5 CON-25	SS- S-7/S	SS- S-6.1/S	SS- S-3.1/S	SS- SP4/5S	SS- T-2/S	SS- BC/S	SS- CF-SP
			1/0)				 		
C ₅ Alkylbenzene (3 isomers)	-	20,000JN	(·/) ~		-	-	-	-	-	-
Methyldecahydronaphthalene	-	20,000JN	• ()-/	/1-/	_	-	-	-	-	-
CoAlledatores			<u></u>					•		
C ₃ Alkylstyrene (2 isomers)	•	· 20,000JN	-	\J-/	\sim	· ·	•	-	-	-
C _{&} Alkylstyrene (4 isomers)	•	26,000JN	-	.~	· _	$\rangle \cdot \rangle$, -	-	-	-
Methylnaphthalene	-	NE000,02			_ <	1.	_	-		-
C ₂ Alkylnaphthalene				_	_		_	_		_
(3 isomers)	-	MC000,00		-	-	• •	-	_	_	_

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Table VII (continued)
Saad Site - Phase I
Soil/Sediment Samples
Extractable Organic Analysis
(in ug/kg)(1)

Compound	SS- LN-DL/S	\$S- \$N-05/S	SS- CON-15 CON		SS- S-6.1/S	SS- S-3.1/S	SS- SP4/5S	SS- T-2/S	SS- BC/S	SS- CF-SP
			// \	\						
C ₄ Aikyinaphthailene		70,000JN	$\langle \rangle$	ノヘ					_	
(7 isomers) C2Alkylbiphenyl	•	70,000,14	· / /) ⁻		•	-	-	•	-	•
(2 isomers)	-	26,000JN	- <	< 1 -/-	<u>\`</u>	•	<u>-</u>	-	-	-
Methyldibenzofuran	-	· 20,000JN		7./		\	-	-		-
Methylflourene	-	26,000JN	'- -			> -\	- >	-	-	-
										
C ₂ Aikylflourene	-	20,000JN	-	_	- <	/ -	-	-	-	-
Methylphenanthrene						/				
(2 isomers)	-	20,000JN	-	-	-	•	-	-	-	-

Table VII (continued)
Sand Site - Phase I
Soil/Sediment Samples
Extractable Organic Analysis
(in ug/kg)(1)

			(Ar	n n8\psi \range(\psi)						
Compound	SS- LN-DL/S	55- 54-05/5	SS- CON-JS CON-2	SS- S-7/S	SS- S-6.1/5	\$\$- \$-3.1/\$	SS- SP4/5S	SS- T-2/S	SS- BC/S	SS- CF-SP
										
C ₃ Alkylphenanthrene)						
(5 isomers)	· -	26,000JN	\vee) \vdash		_	-	-	-	_	-
Methylnaphthethiophene	•	20,000 JN	- ()-	<u> </u>	_	-	-	-	-	-
			<u> </u>					•		
Methylflouranthene			•	\ \		\nearrow				
(2 isomers)	-	· 20,000JN	-	V- Z	\wedge \rangle		-	-	-	-
Methyl(cyclohexylmethyl) Cyclohexane	-	-		NE000, ec	-	<i>/</i> :~	> -	-	•	-
Hexamethyloctahydroindene		_		59,000JN		/ _	-	_		
C ₃ Alkyinaphthalene	•	-		59,000JN	-	<u>-</u>	•	•	-	- 2
				-						<u></u>
C4Alkylnaphthalene (3 isomers)	•	-	• •	59,000JN	-	-	-	-	-	-

Table VII (continued)

Saad Site - Phase I

Soil/Sediment Samples

Extractable Organic Analysis

(in ug/kg)(1)

Compound	SS- LN-DL/S	58- LU-05/5	S- SON-15	SS- CON-25	SS- S-7/S	SS- S-6.1/S	SS- S-3.1/S	SS- SP4/5S	SS- T-2/S	SS- BC/S	SS- CF-SP
		$\overline{}$		$\overline{\wedge}$							
Hexadecenoic Acid	_	_		>)	_	6,000JN	-	-	_	_	
Heptadecanoic Acid			< /	\mathbf{Y}		5,000314 5,000JN	•	-	- -	-	•
riepiatecalmic Actu	_	-	~ /	/) /	/	7,0003 14	-	-	-	-	•
				4/	11		<u>_</u>				
Hexadecanoic Acid,				\ <u>\</u>	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \						
Methyl Ester	-	•	•	-	7 -/ /	NEQOO'SE	> -	-	-	•	-
Petroleum Product	NQ	· NQ	NQ	NQ	Mb/	NO		-	NQ	NQ	N
•					* \	\wedge	\ \				
* Priority pollutant.					•		$/ \sim$	>			
- Material was analyzed for I	but not detected.							,			
NA Not analyzed for.	ou ior octacieu.										
In not analyzed to.						`	✓				

J Estimated value.

N Presumptive evidence of presence of material.

NQ Not quantified.

(1) Dry weight.

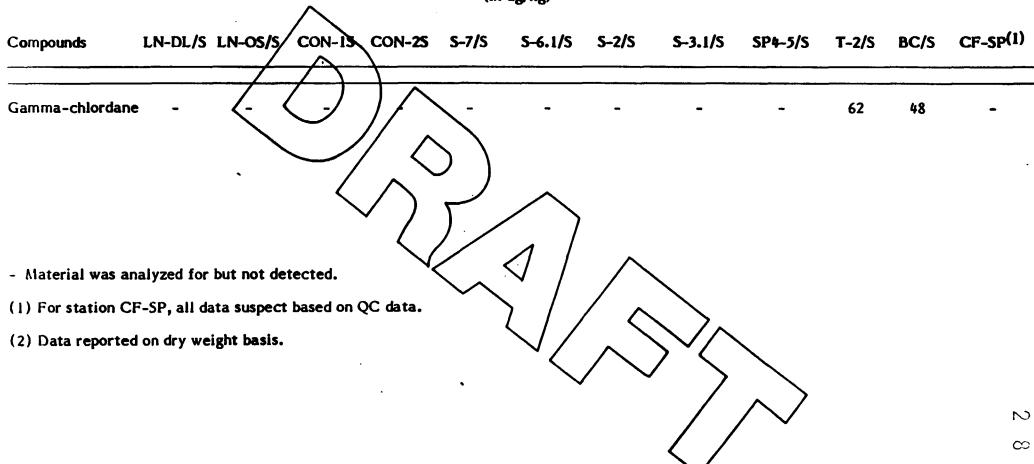
⊗ ⊗ Table VIII

Saad Site - Phase I

Soil/Sediment Samples

Pesticides/PCB's and other chlorinated compounds

(in ug/kg)(2)



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Table IX
Saad Site - Phase II
Water Samples
Inorganic Analysis
(in ug//)

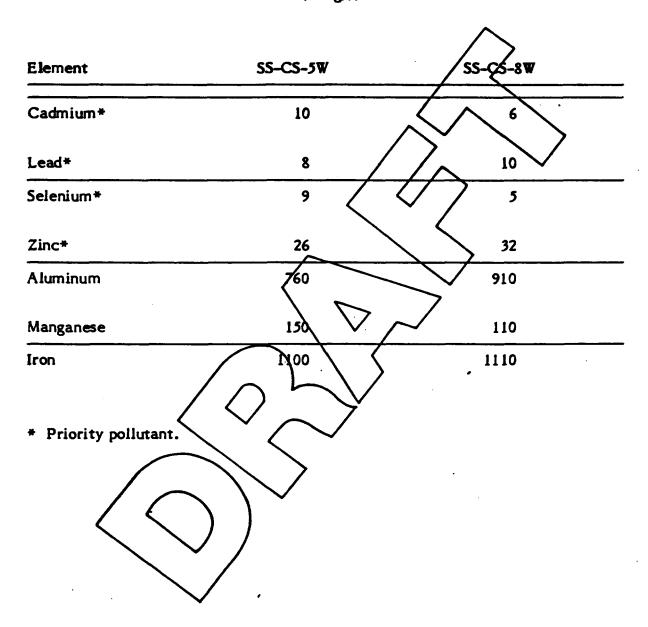


TABLE X

Saad Site - Phase II

Water Samples

Purgeable Organics Analysis

(in ug/l)

f 1

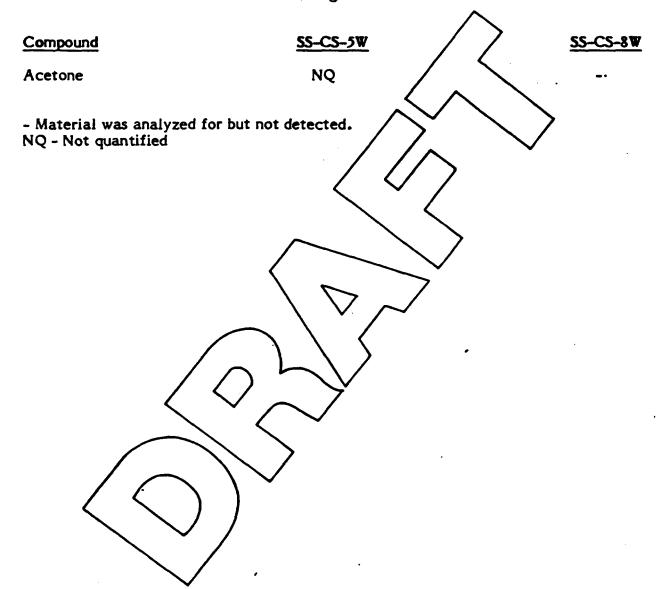


TABLE XI

Saad Site - Phase II

Water Samples

Extractable Organic Analysis

(in ug/l)

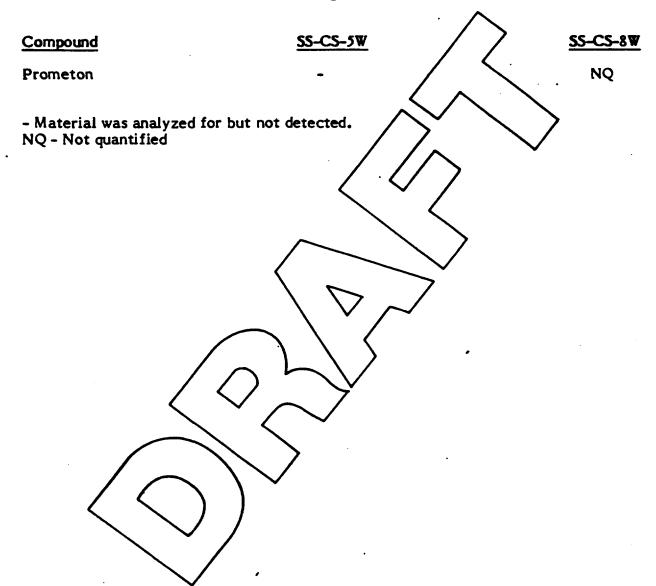


Table XII
Saad Site - Phase II
Soil/Sediment Samples
Inorganic Analysis(1)
(in ug/kg)

E l em en t	SS-CS-1	SS-CS/2	-55-C3-3	SS-CS-3A	SS-CS-4	SS-CS-5S	SS-CS-6	\$\$-C\$-7	SS-CS-8S
***		_/_/	} }			***************************************			
Aluminum	2,500,000	3,000,000	1,600,090	1,300,000	2,000,000	930,000	2,100,000	1,800,000	2,900,000
Manganese	280,000	230,000	220,000	160,000	240,000	260,000	130,000	240,000	230,000
Iron	1,400,000	860,000	770,000	610,000	480,000	1,200,000	420,000	500,000	1,700,000
Cyanide*	-	-	- (1 \$,400	1,000	-	•	•
					$^{\prime}$ $^{\prime}$				
	was analyzed f	for but not detecte	:d		1	\mathcal{N}			

⁽¹⁾ Data reported on a wet weight basis.

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Table XII
Saad Site - Phase II
Soil/Sediment Samples
Inorganic Analysis(1)
(in ug/kg)

Element	SS-CS-I	SS-CS-Z	\22-CZ-3	SS-CS-3A	SS-CS-4	SS-CS-5S	SS-CS-6	SS-CS-7	SS-CS-8S
Silver *	-	\\	J.)/	2,700	-	-	-	. •	-
Barium	35,000	33,000	46,000	\bigcirc -)	48,000	120,000	22,000	30,000	25,000
Cadmium*	900	200	3,900	1,700	17300	1,100	500	1,000	1,100
Cobalt	-	•	. <	9,100	1 /	<u></u>	-	-	-
Chromium*	3,300	2,400	5,100	4,700	2,500	3,700	2,600	3,300	6,500
Copper*	7,200	-	10,000	7,300	9,400	24,000	\ ·	-	9,600
Nickel*	+	-	7,500	10,000	-	6,700		-	5,200
Lead*	11,000	-	110,000	56,000	210,000	5(,000	-	38,000	17,000
Selenium*	2,700	4,200	2,900	3,800	3,200	1,900	. 2,000	3,200	3,100
Zinc*	13,000	12,000	160,000	160,000	110,000	58,000	4,100	000,81 0282	41,000 8 Z

Table XIII Saad Site - Phase II Soil/Sediment Samples Purgeable Organic Analysis (in ug/kg)(1)

Compound	SS-CS-1	SS-CS-2	\$5-CS-3	SS-CS-3A	SS-CS-4	SS-CS-5	SS-CS-6	SS-CS-7	SS-CS-8S
			1/						
Methylene Chloride*	-	\ · /	//- ^	88	34	-	-	-	-
1,1,1-Trichloroethane*	-	/	/ <u>,</u> \)	1.5 J	•	-	-	-
Trichlorotriflouroethane	-	3,300 JN	7-)) -/	<u>}-</u>	•	3.7 JN	5.1 JN	
Trimethylpentane	-	2,500 JN	-\	<u> </u>	-/	-	-	-	
Flourotrichloromethane	-	-	3.6	<u>-</u>	4.4	\ -\	3,400	5.3	
Hexane	-	-	-	- <	//-~	\\/	2.6 JN	-	
Acetone	-	-	•	` -	Ž	- /	-	•	19 J
2-hexanone	-	-	-	-	-	-/		-	•
						</td <td>/ .</td> <td></td> <td>\sim</td>	/ .		\sim
- Material was analyzed	for but r	not detected.				V	•		တ

⁻ Material was analyzed for but not detected.

J Estimated value.

N Presumptive evidence of presence of material.

^{*} Priority pollutant.

⁽¹⁾ Data reported on wet weight basis.

Table XIV (continued)
Sand Site - Phase II
Soil/Sediment Samples
Extractable Organic Analysis
(ug/kg)(3)

Compound	SS-CS-1(1)	55-25-2(1)	SS-CS-3A(2)	\$5-C\$-4	\$S-CS-55(1)	SS-CS-6(1)	SS-CS-7(1)	\$S-C\$-8\$
Indeno(1,2,3-CD)Pyrene*	•	£ 008	// ^-	_	-	-	-	-
Dibenzo(A,H)Anthracene*	-	800 J	<u></u>		-	•	-	-
Benzo(6HI)Perylene*	-	800 J	4.1)/	7 -	•	-	-	-
Hydroxymethylpentanone	550 JN	•	- 400 20	/ -/	-	-	0.32 JN	-
Tetradecanoic Acid	•		- 1300 N	1/-~	<u> </u>	-	-	-
Pentadecanoic Acid	• .	-			·\-\	-	-	-
Hexadecanoic Acid	•	-	- 4100 JN		7- ^	-	-	•
Octadecanoic Acid	-	-	- 800 JN	-	/-/~	-	-	-
Hexane	•	-		-	1800 JN	-	•	-
Petroleum Product	-	•	-	-	N'	-	-	- 1

Table XV
Saad Site - Phase III
Water Samples
Inorganic Analysis

				c Analysis ug/l)		•	
Element	SS WT-1	SS- CF-MW3	SS- CF-MW3	SS- CF-MW4	SS- CF-MW5	SS- LN-MW6	SS-MW7
Arsenic*	:		\bigcirc	-	-	<u>.</u>	35
Cadmium*	400) \ \ '\	-	5	5	6
Chromium*	18	•	1-1	1 - ^	16	-	32
Nickel*	-	-	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\		-	66	65
Lead*	9	18	47	20	V\15	24	41
Selenium*	11	-	-	'	·		-
Zinc*	49	54	58	53	54/	51	46
Aluminum	530	430	5,200	100	< / ·	-	7,800
Manganese	44	250	5,000	6,500	730	780	21,000
Iron	740	670	11,000	12,000	7,200	1,600	50,000

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^{*} Priorty pollutant.

⁻ Material was analyzed for but not detected

Table XVI
Saad Site - Phase III
Water Samples
Purgeable Organic Analysis
(in ug/l)

	\wedge	r ur geab	(in ug/I)	iai yata			
Compound	SS (I)	SS- CF-MW2	SS- CF-MW3	SS- CF-MW4	SS_(1) CF-M W 5	SS_(1) LN-MW6	SS- SS-MW7
	$\overline{\hspace{1cm}}$						
Vinyl Chloride*	$\langle \mathcal{O}_{a} \rangle / \langle $	/	-	•	• '	-	6,600
Chloroethane*	\-\frac{1}{2}	$\langle \cdot \rangle$	-	61	-	15	240
Methylene Chloride*				-	<u>-</u>	-	19,000
1,1 - Dichloroethene	-	()/	<u> </u>	-	-	-	690
1,1 - Dichloroethane*	•	V.	4-1	67	-	21	1,100
Trans-1,2-Dichloroethene	-		·> -/	10 J	-	-	95,000
Chloroform*	74	-	4/	· :/	/ /-\	-	11
1,2-Dichloroethane*	-	- .	- ' (\ <u>-</u>		31
1,1,1-Trichloroethane*	-	-		-	7- ^	69	15,000
Bromodichloromethane	10	-		-	/	-	-
Trichloroethene	-	*	-	-	V.	240	69,000
Benzene*	-	-	-	-	-	10 Ј	67
Tetrachloroethene		-	-	- .	<u>.</u>	-	49,000
Toluene*	-		-	-	-	10 J	3,900
Chlorobenzene*	-		-	-	-	-	87

Ethyl Benzane*

Table XVI (continued) Saad Site - Phase III **Water Samples** Purgeable Organic Analysis (in ug/l)

7 1 1 1 4 1 1 1 1 1 1 1 1 1 1

	^		4000 -87 -77				
Compound .	SS_(1)	SS- CF-MW2	SS- CF-MW3	SS- CF-MW4	SS_(1) CF-MW5	SS_(1)	SS- SS-MW7
Acetone	NQ	<u></u>	_	NQ	_	NQ	NQ
Methylcyclohexane	\\\\\\!\!	NO	-	NQ	-	NQ	NQ
Dichloroflouromethane ,			-	NQ	•	-	-
Cyclohexane	·/) F		NQ	-	-	-
Dimethylheptadienyne	•	()-/	1-	-	_	-	NQ
Hexanone	-	\\-____\	</td <td></td> <td>•</td> <td>-</td> <td>NQ</td>		•	-	NQ
Propylheptanol	-	-	5 -/		<u> </u>	-	NQ
Methy!heptane	-	-			//	-	NQ
Trichloroflouromethane	•	-	- \		>	•	10 J
Unidentified Compounds (2)	-	-	•	1	/-/) ı	2
- Material was analyzed for	r but not detected.			<			
* Priority pollutant.				Ì	\checkmark .		

- * Priority pollutant.
- J Estimated value.
- NQ Not quantified
- (1) Quantity is suspect based on QC data.
- (2) Reported in number of compounds detected, not ug/l.

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> 0 C_{\square} **** > >

Table XVII
Saad Site - Phase III
Water Samples
Extractable Organic Analysis
(in ug/l)

	/	_	•	(m ag/m				•
Compound		SS WT-I	SS- CF-MW2	SS_(1) CF-MW3	SS_(1) CF-MW4	SS- CF-MW5	SS- LN-MW6	SS- SS-MW7
Phenol*	11)		_	•		•	960
2,4-Dimethylphenol*		/ر-		-	-	-	-	33
4-Chloro-3-Methylpheno	ol	1	<u> </u>		-	-	<u>-</u>	25 J
Trimethylphenol		_ \	1-5	/- >	-	-	-	NQ
Methylethylphenol		-	Ž	Q-/		-	-	NQ
Phosphonic Acid, Tributyl Ester		-	-				-	NQ
Unidentified Compounds	3 (2)	•	-	,	-	76 ^	>-	9
- Material was analyzed	d for but n	ot detecte	ed.		<		~	

* Priorty pollutant.

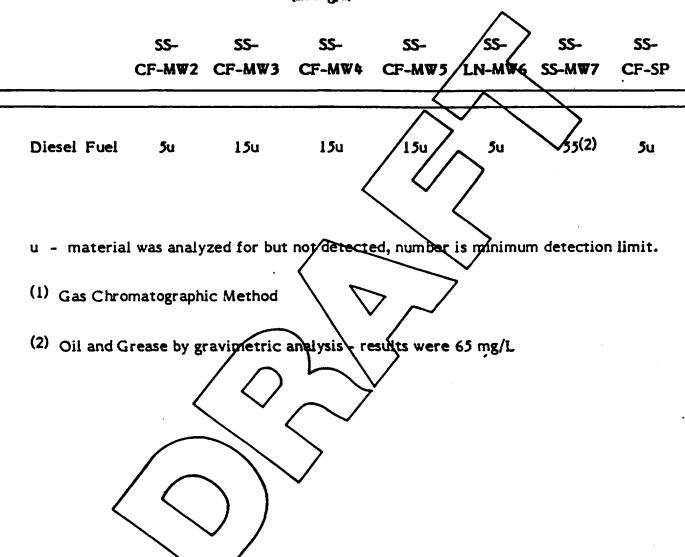
NQ Not quantified.

- J Estimated value.
- (1) Quantity for phenols is suspect based on QC data.
- (2) Reported in number of compounds detected; not in ug/l.

Table XIX
Saad Oil Company
Nashville, TN
Field Data

Station	pH (SU)	Temperature C º	Conductivity (umhos)
SS-CW-8W(1) SS-CS-5W (1)	7.80 9.47	28 35	<u>-</u>
SS-S-7-W SS-S-3.1-W	5.04 5.47	17.5 16.6	<u> </u>
SS-S-6.1-W SS-SP4-5-W	4.77 5.40	16.2	
SS-S-2-W SS-T-2-W	6.36 6.23	17.3	
SS-BC-W SS-PW-1W	7.11 7.07	17.3	560
SS-PW-2W SS-LN-DL-W	6.51 7.52	19.1	450
SS-LN-DS-W SS-FB-W	6.81	27.6	-
SS-WT-1 SS-CF-MW2	7.45	23.0	- -
SS-CF-MW3 SS-CF-MW4	6:37 NA	23.0 NA	<u>-</u>
SS-CF-MW5 SS-LN-MW6	6,35	18.0 21.0	<u>-</u>
SS-SS-MW7	6)18	19.0	-
NA - Not available - Measurement not	taken.		

Table XVIII
Saad Site - Phase III
Nashville, Tennessee
Water Samples
Diesel Fuel Analysis
(in mg/l)(1)



APPENDIX G

DAILY CHRONOLOGY OF FIELD ACTIVITIES

TABLE 4 DAILY CHRONOLOGY OF FIELD ACTIVITIES

DATE	ACTIVITY
March 17, Tuesday	Health & Safety Meeting Begin Tank Sampling
March 18, Wednesday	Finish Tank Sampling Borehole 4 Borehole 14 Borehole 15 Borehole 16
March 19, Thursday	Borehole 1 Borehole 2 Borehole 3 Borehole 17 Borehole 18
March 20, Friday	Borehole 5 Borehole 6 Borehole 19 Borehole 20 Survey
March 21, Saturday	Borehole 7 Borehole 8 Borehole 9 Borehole 10 Borehole 12 Survey
March 22, Sunday	Borehole 11 Borehole 21 Survey
March 23, Monday	Collect Water Samples Redrill B-17, B-19, B-21
March 24, Tuesday	Borehole 13 Collect Water Sample Install Monitoring Well at B-18
March 25, Wednesday	Collect Water Sample Install Monitoring Well at B-11 Skimmer Test B-11
March 26, Thursday	Finish Survey Install Monitoring Well at B-14 Finish Water Sample Collection Redrill B-7
March 27, Friday	Site Clean-up